



Huntington Power Plant

6 miles west of Huntington, Utah on Hwy. 31
P.O. Box 680
Huntington, Utah 84528

June 13, 2018

Mr. Bryce Bird, Director
Utah Department of Environmental Quality
Division of Air Quality
195 North 1950 West
P. O. Box 144820
Salt Lake City, Utah 84114-4820

Attn: Mr. Norm Erikson

RE: 2018 RATA Reports

Dear Mr. Bird,

The Annual Source Emission Test Reports, or Relative Accuracy Test Audits (RATAs) of the Continuous Emissions Monitoring Systems (CEMs) in service at the PacifiCorp Huntington Plant Units 1 and 2 have been completed per the specifications found in 40 CFR Part 60 and 75. The mid-, and high-load Flow RATAs, along with the Gas RATAs were conducted May 9 - 10, 2018 on Units 1 and 2.

Enclosed are the RATA reports for the Huntington Plant Unit 1 and 2 Flow and Gas CEMs.

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of the law that I have personally examined, and am familiar with, the statements and information submitted in this document and its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Should you have any questions or concerns, please contact Richard Neilson at (435) 687-4334.

Sincerely,

A handwritten signature in blue ink, appearing to read "Darrell J. Cunningham".

Darrell J. Cunningham
Managing Director –Huntington Plant
Responsible Official

Enclosures: "Source Test Report – 2018 Relative Accuracy Test Audits"

cc: Sara Loiacono - EPA Region VIII w/enclosure

Richard Neilson – Huntington Plant w/ enclosures
Dave Barnhisel – NTO w/o enclosures

**SOURCE TEST REPORT
2018 Relative Accuracy Test Audits
PacifiCorp
Huntington Power Plant Unit 2
Huntington, Utah**

Prepared For:

PacifiCorp
Huntington Power Plant
Highway 31
Huntington, Utah 84528

For Submittal To:

Utah Division of Air Quality
195 N 1950 W
Salt Lake City, Utah 84114

Prepared By:

Montrose Air Quality Services, LLC
990 W. 43rd Avenue
Denver, Colorado 80211

Document Number: **043AS-341541-RT-115**
Test Date: **May 9, 2018**



Introduction

Montrose Air Quality Services (Montrose) was contracted by PacifiCorp to conduct source testing services at the Huntington Power Plant near Huntington, Utah. The Huntington Plant comprises two pulverized coal-fired boilers, each equipped with low-NO_x burners and overfire air for nitrogen oxides (NO_x) control, a flue gas desulfurization (FGD) scrubber for sulfur dioxide (SO₂) control and pulse-jet fabric filters for PM control. In accordance with Utah Department of Environmental Quality (UDEQ) Operating Permit 1501001004, the Unit #1 and Unit #2 exhaust stacks are equipped with Continuous Emission Monitoring Systems (CEMS) to quantify carbon dioxide (CO₂), sulfur dioxide (SO₂) and nitrogen oxides (NO_x) emissions. Unit #1 is also equipped with a CEMS to quantify carbon monoxide (CO) emissions. Monitoring system information is given in the table below.

Monitor Location	Parameter	Monitor Make /Model	Part 75 Monitor ID
Huntington Unit 2	SO ₂	Thermo Fisher Model 43i	211

Testing was conducted to satisfy state and federal quality assurance requirements. Contact information for the project is listed in the table below.

Contact	Affiliation	Telephone	E-mail
Frank Zampedri Environmental Analyst	PacifiCorp	(801) 220-2169	frank.zampedri@pacificorp.com
Richard Neilson Environmental Engineer	PacifiCorp	(435) 687-4334	richard.neilson@pacificorp.com
Norm Erikson Environmental Scientist	UDEQ	(801) 536-4063	nerikson@utah.gov
Craig Kormylo Senior Project Manager	Montrose	(303) 810-2849	ckormylo@montrose-env.com

Scope of Work

Relative accuracy test audits (RATAs) were performed in accordance with 40 CFR Part 75 on the Unit #2 Exhaust CEMS. RATA testing was performed at high load to determine the relative accuracy of the SO₂ CEMS in accordance with the annual RATA requirements of 40 CFR Part 75 Appendix B, §2.3.1.2(a). The details of each test are given in the table below.

Source	Location	Regulation	Test Type	Load Level	Parameter
Huntington Unit 2	Outlet	40 CFR Part 75	RATA	High	SO ₂ (ppmvw)

Abbreviations:

ppmvw: parts per million, wet volume

Testing Methods

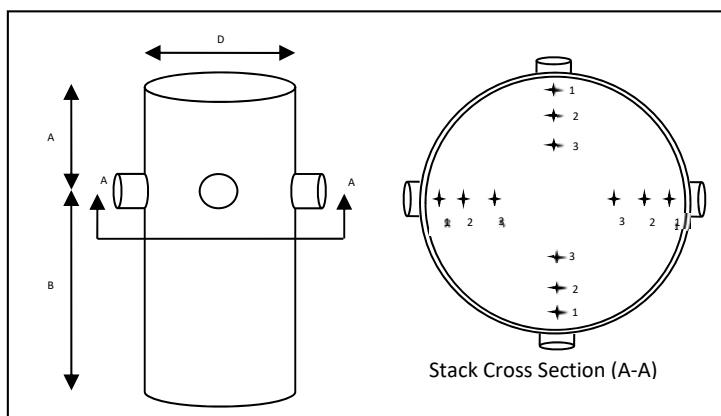
Montrose used the following EPA Reference Methods for the testing program. No deviations from the Reference Methods were noted. All RATAs consisted of at least nine test runs.

Source	Parameter	EPA Reference Method	Test Runs/Duration
Huntington Unit 2	SO ₂ (ppmvw)	6C	9 @ 21 minutes

Testing Location

The Huntington Unit 2 exhaust sampling location consists of a vertical, circular stack with an interior diameter of 322.7 inches and four orthogonal sampling ports located 9.9 diameters downstream and 8.2 diameters upstream of the nearest flow disturbances.

Prior to commencing each RATA, pollutant gas stratification testing was performed across a grid of 12 points determined using EPA Method 1 in accordance with 40 CFR Part 60, Appendix B, PS2 §8.1.3.2 and 40 CFR Part 75, Appendix A, §6.5.6.1. Stratification testing was performed for two minutes per traverse point in accordance with 40 CFR Part 75, Appendix A, §6.5.6.1(c). As diluent (CO₂) and pollutant (NO_x or SO₂) concentrations were within 5% of their mean concentrations, subsequent gas RATA testing was performed at a single point in the stack as allowed by 40 CFR Part 60, Appendix B, PS2 §8.1.3.2¹ and 40 CFR Part 75, Appendix A §6.5.6.3(b). See the schematic below.



Stratification Test Diagram		
Unit #	1	2
Diameter (D)	323.3"	322.7"
Upstream Distance (A)	>220'	>220'
Downstream Distance (B)	>266'	>266'
Sample Point Distances from Stack Wall		
Traverse Point 1	14.1"	14.1"
Traverse Point 2	47.3"	47.3"
Traverse Point 3	95.7"	95.5"

¹ PS2 prescribes a minimum of three sampling points, but states that "Other traverse points may be selected, provided that they can be shown to the satisfaction of the Administrator to provide a representative sample over the stack or duct cross section." Accordingly, if 40 CFR Part 75, Appendix A §6.5.6.3(b) allows RATA testing at a single traverse point, single-point testing can be assumed to "provide a representative sample" for the purposes of 40 CFR Part 60, Appendix B, Performance Specification 2.

Test Results

The results of the testing program are given in the tables below. Detailed test results are located in Appendix A, along with sample calculations for all computed values. Relative accuracy for each parameter was calculated using nine test runs; stricken values indicate discarded test runs.

PacifiCorp Huntington Unit 2 RATA Results Summary (5/9/2018) High Load (474 MW)					
Run #	Start Time	Stop Time	SO ₂ (ppmvw)		
			RM	CEM	Difference
1	7:31	7:51	21.3	22.2	-0.9
2	8:08	8:28	19.4	20.0	-0.6
3	8:43	9:03	23.8	24.6	-0.8
4	9:18	9:38	24.2	25.2	-1.0
5	9:53	10:13	21.2	22.3	-1.1
6	10:28	10:48	24.1	24.6	-0.5
7	11:02	11:22	23.8	24.6	-0.8
8	11:36	11:56	25.2	25.6	-0.4
9	12:10	12:30	25.8	26.3	-0.5
Average			23.2	23.9	-0.7
Relative Accuracy			4.0%		
40 CFR Part 75 Annual Limit			7.5%		
Bias Adjustment Factor			1.000		

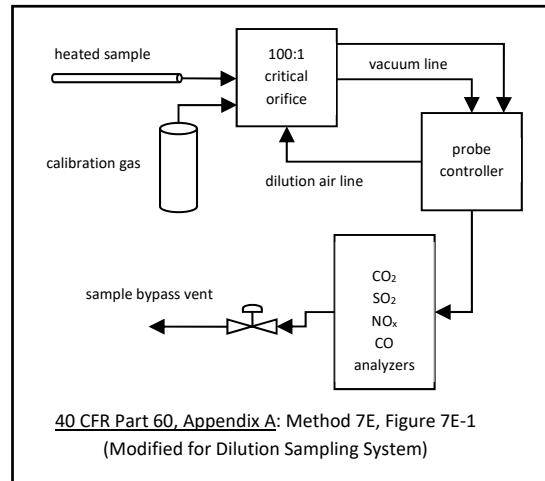
Testing Equipment

All testing equipment was housed in a climate-controlled mobile analytical laboratory custom-designed and built by Montrose. All required quality assurance tests were performed as required by the applicable Reference Methods. Detailed equipment descriptions are given in the table below.

Parameter	Equipment	EPA Reference Method
Sulfur Dioxide (SO ₂)	Thermo Fisher 43i Pulsed Fluorescence Analyzer	6C

Test Details

Pollutant gas testing was performed using EPA Method 6C. Each test run was 21 minutes in duration. A sample of exhaust gas was withdrawn from the outlet at a constant flow rate using a heated stainless steel probe, transported through a Teflon sample line and a sample dilution system consisting of a heated filter and an M&C Aspirator fitted with a 100:1 critical orifice, and directed to a Thermo Model 43i Pulsed Fluorescence SO₂ Analyzer. (See Figure 7E-1 at right.) Concentrations of SO₂ were reported in units of parts per million on a wet volume basis (ppmvw). Gas concentration data were recorded as ten-second and one-minute averages to an Excel spreadsheet. Prior to sampling, the instruments were calibrated in accordance with EPA Method 7E using EPA Protocol 1 calibration gases. Following each test run, the analyzers were challenged with EPA Protocol 1 calibration gases to determine instrument drift and to correct the raw pollutant data for system bias. Concentrations of SO₂ were compared with concurrently reported CEMS data to determine the relative accuracy of the CEMS for comparison to the applicable performance specifications from 40 CFR Part 75, Appendix C.



Appended Information

Supporting data for this testing program are included as follows.

Appendix A: Gas Testing

- Pollutant Stratification Test
- Analyzer Calibration Error Tests
- Data Reduction Spreadsheets
- Analyzer Interference Check
- Sample Calculations
- Field Datasheets
- CEMS Data
- EPA Protocol 1 Gas Certificates
- Reference Meter Calibration Certificate

Appendix B: STAC Certification



Appendix B: Gas Testing

Pollutant Stratification Test

Analyzer Calibration Error Tests

Data Reduction Spreadsheets

$\text{NO}_2 \rightarrow \text{NO}$ Converter Efficiency Test

Analyzer Interference Check

Sample Calculations

Field Datasheets

CEMS Data

EPA Protocol 1 Gas Certificates

Job Code 043AS-341541
 PacifiCorp, Huntington Unit 2
 Test Date: 5/9/18

Parameter:

CO2 (%vw)							
Run #	Start Time	End Time	Load	RM	CEM	Difference	Used?
1	7:31	7:51	470	10.5	10.4	0.1	x
2	8:08	8:28	475	10.5	10.4	0.1	x
3	8:43	9:03	475	10.5	10.3	0.2	x
4	9:18	9:38	474	10.5	10.3	0.2	x
5	9:53	10:13	473	10.5	10.3	0.2	x
6	10:28	10:48	472	10.4	10.4	0.0	x
7	11:02	11:22	473	10.4	10.4	0.0	x
8	11:36	11:56	473	10.6	10.4	0.2	x
9	12:10	12:30	479	10.6	10.5	0.1	x
10							
11							
12							
13							
14							
15							
Average			474	10.5	10.4	0.1	

RATA Results

Number of Runs:	9
T-value	2.306
Standard Deviation	0.1
Confidence Coefficient	0.1
Relative Accuracy (%RM)	1.8%
Emission Limit	n/a
Relative Accuracy (%EL)	n/a
Bias Adjustment Factor	1.012

P75, Annual: O2 / CO2 %

Relative Accuracy Limit:
 RA≤7.5% or ±0.7%

Parameter:

NOx (lb/mmBtu)							
Run #	Start Time	End Time	Load	RM	CEM	Difference	Used?
1	7:31	7:51	470	0.198	0.208	-0.010	x
2	8:08	8:28	475	0.199	0.207	-0.008	x
3	8:43	9:03	475	0.199	0.210	-0.011	x
4	9:18	9:38	474	0.203	0.216	-0.013	x
5	9:53	10:13	473	0.208	0.219	-0.011	x
6	10:28	10:48	472	0.206	0.214	-0.008	x
7	11:02	11:22	473	0.203	0.214	-0.011	x
8	11:36	11:56	473	0.196	0.208	-0.012	x
9	12:10	12:30	479	0.185	0.195	-0.010	x
10							
11							
12							
13							
14							
15							
Average			474	0.200	0.210	-0.010	

RATA Results

Number of Runs:	9
T-value	2.306
Standard Deviation	0.002
Confidence Coefficient	0.001
Relative Accuracy (%RM)	5.9%
Emission Limit	n/a
Relative Accuracy (%EL)	n/a
Bias Adjustment Factor	1.000

P75, Annual: NOx lb/mmBtu

Relative Accuracy Limit:
 RA≤7.5% or ±0.015 lb/mmBtu

Parameter:

SO2 (ppmvw)							
Run #	Start Time	End Time	Load	RM	CEM	Difference	Used?
1	7:31	7:51	470	21.3	22.2	-0.9	x
2	8:08	8:28	475	19.4	20.0	-0.6	x
3	8:43	9:03	475	23.8	24.6	-0.8	x
4	9:18	9:38	474	24.2	25.2	-1.0	x
5	9:53	10:13	473	21.2	22.3	-1.1	x
6	10:28	10:48	472	24.1	24.6	-0.5	x
7	11:02	11:22	473	23.8	24.6	-0.8	x
8	11:36	11:56	473	25.2	25.6	-0.4	x
9	12:10	12:30	479	25.8	26.3	-0.5	x
10							
11							
12							
13							
14							
15							
Average			474	23.2	23.9	-0.7	

RATA Results

Number of Runs:	9
T-value	2.306
Standard Deviation	0.2
Confidence Coefficient	0.2
Relative Accuracy (%RM)	4.0%
Emission Limit	n/a
Relative Accuracy (%EL)	n/a
Bias Adjustment Factor	1.000

P75, Annual: SO2 / NOx ppm

Relative Accuracy Limit:
 RA≤7.5% or ±12.0ppm

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5/9/2018



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	Run #	1	2	3	4	5	6	7	8	9	Average
	Start Time	7:31	8:08	8:43	9:18	9:53	10:28	11:02	11:36	12:10	
	Stop Time	7:51	8:28	9:03	9:38	10:13	10:48	11:22	11:56	12:30	

EPA Method 3A, 6C, 7E and 10 Data

	1	2	3	4	5	6	7	8	9	Average
CO ₂ (%vw)	10.5	10.5	10.5	10.5	10.5	10.4	10.4	10.6	10.6	10.5
SO ₂ (ppmvw)	21.3	19.4	23.8	24.2	21.2	24.1	23.8	25.2	25.8	23.2
NO _x (ppmvw)	97.0	96.8	97.0	99.6	101.0	99.3	98.4	96.3	91.7	97.4
NO ₂ (ppmvw)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2
CO (ppmvw)	98.8	82.2	65.9	80.1	52.8	34.6	22.3	48.9	125.4	67.9

Mass Emission Calculations (Using EPA Method 19)

	1	2	3	4	5	6	7	8	9	Average
F _c	scf/mmBtu	1800								
	CO ₂ (lb/mmBtu)	0.061	0.056	0.068	0.069	0.061	0.070	0.068	0.071	0.066
	NO _x (lb/mmBtu)	0.198	0.199	0.199	0.203	0.208	0.206	0.203	0.196	0.200
	CO (lb/mmBtu)	0.123	0.103	0.082	0.100	0.066	0.044	0.028	0.061	0.084
	Plant CEMS Data	1	2	3	4	5	6	7	8	9
	Unit Load (MW)	470	475	475	474	473	472	473	473	479
CO ₂ (%vw)	10.4	10.4	10.3	10.3	10.3	10.4	10.4	10.4	10.4	10.5
SO ₂ (ppmvw)	22.2	20	24.6	25.2	22.3	24.6	24.6	25.6	25.6	26.3
SO ₂ (lb/mmBtu)	0.064	0.057	0.071	0.073	0.065	0.071	0.071	0.074	0.075	
NO _x (ppmvw)	101.1	100.4	100.8	103.2	104.9	103.3	103	100.6	95.6	
NO _x (lb/mmBtu)	0.208	0.207	0.21	0.216	0.219	0.214	0.214	0.208	0.195	
CO (ppmvw)	99.1	86.4	71.8	79.7	60.5	39.5	25.8	46.7	131.3	

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Huntington Unit 2

5/9/2018

Test Run #1

Start Time 7:31
 Run Length 21
 Stop Time 7:51

Uncorrected Analyzer Data

Minute	Time	CO ₂ %v/v	SO ₂ ppmvw	NO _x ppmvw	CO ppmvw	NO ₂ ppmvw
1	7:31	10.4	20.6	103.5	51.7	0.0
2	7:32	10.4	21.1	99.7	50.3	0.2
3	7:33	10.5	21.6	96.6	74.4	0.2
4	7:34	10.6	22.3	96.8	104.2	0.1
5	7:35	10.8	23.5	96.9	185.4	0.0
6	7:36	10.9	23.3	100.9	122.1	0.8
7	7:37	10.8	22.6	96.8	120.4	0.2
8	7:38	10.9	22.7	96.7	138.4	0.1
9	7:39	10.8	21.7	97.4	151.2	0.4
10	7:40	10.6	21.1	97.9	89.8	0.1
11	7:41	10.8	20.6	98.2	67.6	0.1
12	7:42	10.7	19.8	95.0	75.7	0.1
13	7:43	10.6	19.5	96.2	81.9	0.2
14	7:44	10.6	19.2	96.6	53.8	0.2
15	7:45	10.7	19.6	96.3	74.5	-0.1
16	7:46	10.9	20.0	98.8	92.8	0.5
17	7:47	10.8	20.0	96.0	135.8	0.0
18	7:48	10.8	20.3	96.2	156.2	0.0
19	7:49	10.8	20.4	97.3	117.1	0.2
20	7:50	10.8	20.5	98.6	89.5	0.1
21	7:51	10.9	20.3	98.0	95.4	0.1
Average		10.7	21.0	97.6	101.3	0.2
C _o pre		0.0	-0.2	-0.2	-0.8	
C _o post		0.0	0.2	0.1	1.2	
C_o		0.0	0.0	-0.1	0.2	
C _m pre		9.1	59.7	144.6	147.2	
C _m post		9.4	58.5	144.2	148.5	
C_m		9.3	59.1	144.4	147.9	
C _{ma}		9.1	60.2	143.4	144.3	
Corrected Average:		10.5	21.3	97.0	98.8	

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Huntington Unit 2

5/9/2018

Test Run #2

Start Time 8:08
 Run Length 21
 Stop Time 8:28

Uncorrected Analyzer Data

Minute	Time	CO ₂ %v/v	SO ₂ ppmvw	NO _x ppmvw	CO ppmvw	NO ₂ ppmvw
1	8:08	10.7	21.0	96.7	129.1	0.2
2	8:09	10.7	20.2	97.1	116.2	0.2
3	8:10	10.9	19.5	99.4	101.5	0.5
4	8:11	10.8	18.9	96.4	101.7	0.0
5	8:12	10.7	18.6	95.3	109.2	0.2
6	8:13	10.6	18.2	95.0	73.5	0.2
7	8:14	10.7	18.1	95.5	85.4	0.4
8	8:15	11.0	17.5	97.8	92.0	0.4
9	8:16	10.7	16.6	97.7	55.1	0.2
10	8:17	10.7	16.6	99.5	55.1	0.2
11	8:18	10.7	14.9	98.5	52.7	0.1
12	8:19	10.7	15.7	98.1	54.0	0.0
13	8:20	11.0	16.9	98.6	80.8	0.4
14	8:21	10.8	16.4	98.3	76.2	-0.1
15	8:22	10.7	17.2	98.8	44.4	0.1
16	8:23	10.8	19.3	97.4	86.8	0.3
17	8:24	11.0	21.4	98.6	106.6	0.3
18	8:25	11.2	22.5	99.6	134.1	0.2
19	8:26	10.8	22.4	99.4	86.8	0.2
20	8:27	10.8	22.6	98.7	64.4	0.1
21	8:28	10.8	22.7	97.8	75.4	0.2
Average		10.8	18.9	97.8	84.8	0.2
C _o pre		0.0	0.2	0.1	1.2	
C _o post		0.0	-0.2	0.1	0.2	
C_o		0.0	0.0	0.1	0.7	
C _m pre		9.4	58.5	144.2	148.5	
C _m post		9.4	58.6	145.4	148.3	
C_m		9.4	58.6	144.8	148.4	
C _{ma}		9.1	60.2	143.4	144.3	
Corrected Average:		10.5	19.4	96.8	82.2	

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Huntington Unit 2

5/9/2018

Test Run #3

Start Time 8:43
 Run Length 21
 Stop Time 9:03

Uncorrected Analyzer Data

Minute	Time	CO ₂ %vv	SO ₂ ppmvw	NO _x ppmvw	CO ppmvw	NO ₂ ppmvw
1	8:43	10.8	25.9	96.5	101.0	0.2
2	8:44	10.9	25.3	98.4	84.9	0.1
3	8:45	10.8	24.4	96.5	71.4	0.2
4	8:46	10.7	23.8	96.6	58.5	0.1
5	8:47	10.6	23.1	98.0	53.7	0.0
6	8:48	10.7	23.0	98.1	75.4	0.4
7	8:49	10.9	23.6	99.8	57.3	0.5
8	8:50	10.7	22.8	97.2	63.1	0.3
9	8:51	10.7	22.4	97.5	68.5	0.3
10	8:52	10.6	22.0	98.4	54.1	0.0
11	8:53	10.7	22.3	99.2	61.1	0.1
12	8:54	10.9	23.1	99.4	53.1	0.4
13	8:55	10.7	22.6	98.1	54.9	0.1
14	8:56	10.7	22.7	98.4	63.2	0.1
15	8:57	10.8	23.4	97.8	84.8	0.3
16	8:58	10.7	23.3	100.4	53.6	0.4
17	8:59	10.9	23.6	98.6	71.4	0.3
18	9:00	10.8	23.8	97.9	81.7	0.0
19	9:01	10.8	23.3	99.1	53.9	0.2
20	9:02	10.8	24.1	98.8	72.2	0.3
21	9:03	10.8	24.4	101.0	81.0	0.5
Average		10.7	23.5	98.4	67.6	0.2
C _o pre		0.0	-0.2	0.1	0.2	
C _o post		0.0	0.2	-0.2	-0.4	
C_o		0.0	0.0	-0.1	-0.1	
C _m pre		9.4	58.6	145.4	148.3	
C _m post		9.3	59.9	145.5	147.7	
C_m		9.4	59.3	145.5	148.0	
C _{ma}		9.1	60.2	143.4	144.3	
Corrected Average:		10.5	23.8	97.0	65.9	

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Huntington Unit 2

5/9/2018

Test Run #4

Start Time 9:18
 Run Length 21
 Stop Time 9:38

Uncorrected Analyzer Data

Minute	Time	CO ₂ %vv	SO ₂ ppmvw	NO _x ppmvw	CO ppmvw	NO ₂ ppmvw
1	9:18	10.8	26.9	101.2	64.8	0.0
2	9:19	10.6	25.4	101.2	54.7	0.1
3	9:20	10.5	24.5	100.9	58.1	0.0
4	9:21	10.6	24.2	100.3	70.2	0.1
5	9:22	10.6	24.1	101.5	59.8	0.1
6	9:23	10.8	24.6	103.9	64.6	0.6
7	9:24	10.7	23.5	101.4	55.0	0.1
8	9:25	10.8	23.9	99.8	116.9	0.1
9	9:26	10.8	24.1	101.0	111.6	0.1
10	9:27	10.8	24.2	102.3	72.0	0.1
11	9:28	10.9	23.8	101.5	92.8	0.5
12	9:29	10.6	22.5	100.4	62.2	0.1
13	9:30	10.6	22.3	99.5	71.6	0.2
14	9:31	10.6	22.7	100.2	52.8	0.3
15	9:32	10.7	22.9	103.0	63.1	0.5
16	9:33	10.9	23.3	100.3	86.4	0.2
17	9:34	10.8	23.2	101.2	79.4	0.3
18	9:35	10.8	23.1	100.8	93.9	0.3
19	9:36	10.9	23.5	99.1	151.0	0.3
20	9:37	10.9	24.1	101.1	123.7	0.2
21	9:38	10.8	23.8	101.0	120.4	0.1
Average		10.7	23.8	101.0	82.1	0.2
C _o pre		0.0	0.2	-0.2	-0.4	
C _o post		0.0	-0.2	-0.1	-1.1	
C_o		0.0	0.0	-0.1	-0.8	
C _m pre		9.4	59.9	145.5	147.7	
C _m post		9.3	58.8	145.7	149.3	
C_m		9.3	59.4	145.6	148.5	
C _{ma}		9.1	60.2	143.4	144.3	
Corrected Average:		10.5	24.2	99.6	80.1	

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 Test Run #5

Start Time 9:53
 Run Length 21
 Stop Time 10:13

Uncorrected Analyzer Data

Minute	Time	CO ₂ %vw	SO ₂ ppmvw	NO _x ppmvw	CO ppmvw	NO ₂ ppmvw
1	9:53	10.7	25.4	102.1	56.8	0.0
2	9:54	10.6	24.7	103.0	47.2	0.1
3	9:55	10.6	23.6	102.6	57.9	0.1
4	9:56	10.7	23.6	102.3	43.1	-0.1
5	9:57	10.8	22.9	103.7	31.7	0.1
6	9:58	10.6	20.4	103.2	36.3	0.2
7	9:59	10.6	20.2	103.0	30.4	0.3
8	10:00	10.7	20.4	102.0	38.8	0.2
9	10:01	10.7	20.3	104.2	51.2	0.5
10	10:02	10.9	19.8	103.1	47.0	0.2
11	10:03	10.7	19.3	102.9	41.7	0.2
12	10:04	10.7	17.8	102.4	43.4	0.3
13	10:05	10.8	18.6	100.8	61.7	0.1
14	10:06	11.0	19.7	102.7	65.4	0.4
15	10:07	11.1	20.5	101.6	97.7	0.3
16	10:08	11.0	20.6	100.4	107.7	0.1
17	10:09	10.9	20.6	101.3	83.2	0.0
18	10:10	10.8	20.0	103.8	80.7	0.3
19	10:11	10.9	18.8	105.6	41.1	0.1
20	10:12	10.9	18.3	101.5	33.9	0.1
21	10:13	10.6	21.1	100.8	27.4	0.2
Average		10.8	20.8	102.5	53.5	0.2
C _o pre		0.0	-0.2	-0.1	-1.1	
C _o post		0.0	0.1	0.0	-1.7	
C_o		0.0	-0.1	-0.1	-1.4	
C _m pre		9.3	58.8	145.7	149.3	
C _m post		9.5	59.1	145.5	148.2	
C_m		9.4	59.0	145.6	148.8	
C _{ma}		9.1	60.2	143.4	144.3	
Corrected Average:		10.5	21.2	101.0	52.8	

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 Test Run #6

Start Time 10:28
 Run Length 21
 Stop Time 10:48

Uncorrected Analyzer Data

Minute	Time	CO ₂ %vw	SO ₂ ppmvw	NO _x ppmvw	CO ppmvw	NO ₂ ppmvw
1	10:28	10.6	26.0	101.3	50.0	0.0
2	10:29	10.6	25.6	101.8	42.7	0.1
3	10:30	10.7	24.8	101.9	42.8	0.0
4	10:31	11.0	24.4	102.4	65.8	0.0
5	10:32	10.7	23.1	102.9	32.2	0.1
6	10:33	10.6	22.5	102.9	10.3	0.1
7	10:34	10.7	22.9	101.0	18.5	0.0
8	10:35	10.8	22.9	103.0	32.8	0.9
9	10:36	10.8	22.8	103.8	18.4	0.1
10	10:37	10.7	22.8	101.0	29.7	0.0
11	10:38	10.8	23.1	99.8	20.0	0.1
12	10:39	10.8	23.3	101.2	32.4	0.2
13	10:40	11.0	24.0	101.6	43.7	0.0
14	10:41	11.0	23.7	100.5	48.5	0.3
15	10:42	10.9	24.1	99.3	65.4	0.1
16	10:43	10.9	23.5	101.0	44.7	0.1
17	10:44	10.8	23.4	100.0	32.7	0.4
18	10:45	11.0	23.5	100.8	23.4	0.4
19	10:46	11.0	23.4	98.6	21.0	0.1
20	10:47	10.9	23.2	98.3	26.5	0.3
21	10:48	10.8	23.0	99.2	24.4	0.2
Average		10.8	23.6	101.1	34.5	0.2
C _o pre		0.0	0.1	0.0	-1.7	
C _o post		0.0	-0.2	-0.2	-0.9	
C_o		0.0	-0.1	-0.1	-1.3	
C _m pre		9.5	59.1	145.5	148.2	
C _m post		9.5	58.9	146.4	148.4	
C_m		9.5	59.0	146.0	148.3	
C _{ma}		9.1	60.2	143.4	144.3	
Corrected Average:		10.4	24.1	99.3	34.6	

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 Test Run #7

Start Time 11:02
 Run Length 21
 Stop Time 11:22

Uncorrected Analyzer Data

Minute	Time	CO ₂ %v/v	SO ₂ ppmvw	NO _x ppmvw	CO ppmvw	NO ₂ ppmvw
1	11:02	10.6	23.1	101.3	25.0	0.0
2	11:03	10.7	19.8	100.8	20.0	0.1
3	11:04	10.8	20.5	102.0	17.5	0.0
4	11:05	11.0	21.3	102.7	27.2	0.4
5	11:06	10.9	21.4	101.3	32.0	0.0
6	11:07	10.9	21.3	101.4	39.6	0.0
7	11:08	11.0	20.9	101.5	13.7	0.0
8	11:09	11.1	21.1	102.6	18.1	0.5
9	11:10	11.0	20.6	102.0	23.1	0.1
10	11:11	10.9	20.5	101.7	14.2	0.1
11	11:12	10.8	24.0	100.6	17.8	0.1
12	11:13	11.0	25.6	98.1	41.2	0.1
13	11:14	11.1	26.6	101.2	40.1	0.1
14	11:15	10.9	26.6	100.9	16.0	0.4
15	11:16	10.8	26.4	99.5	18.2	0.2
16	11:17	10.8	26.0	99.5	15.4	0.0
17	11:18	10.7	25.3	99.3	14.3	0.0
18	11:19	10.9	25.2	101.8	11.7	0.7
19	11:20	10.8	25.0	100.4	18.0	0.0
20	11:21	11.0	24.5	100.6	25.6	0.2
21	11:22	10.9	24.3	100.5	20.5	0.2
Average		10.9	23.3	100.9	22.3	0.2
C _o pre		0.0	-0.2	-0.2	-0.9	
C _o post		0.0	0.0	-0.2	-0.5	
C_o		0.0	-0.1	-0.2	-0.7	
C _m pre		9.5	58.9	146.4	148.4	
C _m post		9.5	59.4	147.9	148.3	
C_m		9.5	59.2	147.2	148.4	
C _{ma}		9.1	60.2	143.4	144.3	
Corrected Average:		10.4	23.8	98.4	22.3	

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 Test Run #8

Start Time 11:36
 Run Length 21
 Stop Time 11:56

Uncorrected Analyzer Data

Minute	Time	CO ₂ %v/v	SO ₂ ppmvw	NO _x ppmvw	CO ppmvw	NO ₂ ppmvw
1	11:36	10.9	24.9	103.2	11.7	0.1
2	11:37	10.9	24.7	102.8	20.0	0.0
3	11:38	11.0	24.7	105.0	12.7	0.6
4	11:39	11.1	25.5	102.6	29.3	0.2
5	11:40	11.1	25.5	100.5	42.7	0.1
6	11:41	11.1	24.8	102.0	39.8	0.2
7	11:42	11.1	25.2	100.7	50.5	0.1
8	11:43	11.3	25.7	102.5	53.8	0.0
9	11:44	11.1	24.6	104.2	23.5	0.1
10	11:45	10.9	24.3	101.4	13.9	0.4
11	11:46	10.9	25.2	101.7	14.0	0.1
12	11:47	11.0	25.1	100.8	15.5	0.2
13	11:48	11.2	25.7	102.3	18.3	0.9
14	11:49	11.2	25.8	96.3	44.0	0.1
15	11:50	11.1	25.6	96.0	49.7	0.2
16	11:51	11.1	24.9	95.5	62.8	0.1
17	11:52	11.3	25.2	94.6	134.7	0.1
18	11:53	11.4	25.4	96.7	118.3	0.2
19	11:54	11.4	25.4	95.2	116.6	0.2
20	11:55	11.3	24.9	95.0	104.3	0.0
21	11:56	11.3	22.8	95.4	75.2	0.2
Average		11.1	25.0	99.7	50.1	0.2
C _o pre		0.0	0.0	-0.2	-0.5	
C _o post		0.0	0.0	-0.2	-1.3	
C_o		0.0	-0.1	-0.2	-0.9	
C _m pre		9.5	59.4	147.9	148.3	
C _m post		9.7	60.4	149.4	150.5	
C_m		9.6	59.9	148.7	149.4	
C _{ma}		9.1	60.2	143.4	144.3	
Corrected Average:		10.6	25.2	96.3	48.9	

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Test Run #9

Start Time 12:10
Run Length 21
Stop Time 12:30

Uncorrected Analyzer Data

Minute	Time	CO ₂ %v/v	SO ₂ ppmvw	NO _x ppmvw	CO ppmvw	NO ₂ ppmvw
1	12:10	11.2	21.3	95.2	89.6	0.1
2	12:11	11.2	25.9	94.1	108.6	0.0
3	12:12	11.4	27.2	95.9	172.4	0.3
4	12:13	11.3	26.7	95.1	122.2	0.1
5	12:14	11.3	27.6	94.1	154.9	0.0
6	12:15	11.2	27.6	94.7	127.2	0.1
7	12:16	11.2	27.9	95.5	104.2	0.1
8	12:17	11.4	28.3	96.5	125.2	0.1
9	12:18	11.5	28.3	95.8	179.3	0.2
10	12:19	11.4	28.0	95.1	209.2	0.1
11	12:20	11.4	27.2	95.6	147.6	0.1
12	12:21	11.3	26.8	95.7	105.7	0.0
13	12:22	11.4	26.8	97.1	118.6	0.7
14	12:23	11.4	26.1	95.8	156.5	0.1
15	12:24	11.3	25.2	95.3	115.2	0.0
16	12:25	11.2	24.8	94.7	93.3	0.0
17	12:26	11.3	24.7	95.2	103.4	0.1
18	12:27	11.4	24.2	96.4	98.2	0.2
19	12:28	11.3	23.7	95.5	124.8	0.3
20	12:29	11.3	23.8	94.7	135.1	0.1
21	12:30	11.4	24.2	95.3	153.6	0.1
Average		11.3	26.0	95.4	130.7	0.1
C _o pre		0.0	-0.2	-0.2	-1.3	
C _o post		0.0	0.2	-0.2	-0.2	
C_o		0.0	0.0	-0.2	-0.8	
C _m pre		9.7	60.4	149.4	150.5	
C _m post		9.7	60.9	149.3	150.6	
C_m		9.7	60.7	149.4	150.6	
C _{ma}		9.1	60.2	143.4	144.3	
Corrected Average:		10.6	25.8	91.7	125.4	

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40 CFR Part 75, Appendix A
§6.5.6 Pollutant Stratification Test

Stack Diameter: **323.0 "**
Stratification Test Point 1: **14.2 "** (4.4%)
Stratification Test Point 2: **47.2 "** (14.6%)
Stratification Test Point 3: **95.6 "** (29.6%)

Port	Point	Time	CO₂	SO₂
1	1	5/8/2018 10:00	10.4	21.9
1	1	10:01	10.4	21.9
1	2	10:02	10.2	21.7
1	2	10:03	10.4	22.4
1	3	10:04	10.5	22.8
1	3	10:05	10.6	23.5
2	1	5/8/2018 10:09	10.6	24.7
2	1	10:10	10.6	24.7
2	2	10:11	10.5	24.3
2	2	10:12	10.5	24.3
2	3	10:13	10.6	24.5
2	3	10:14	10.5	24.5
3	1	5/8/2018 10:20	10.3	26.1
3	1	10:21	10.3	26.1
3	2	10:22	10.4	24.7
3	2	10:23	10.4	23.4
3	3	10:24	10.5	24.9
3	3	10:25	10.4	24.8
4	1	5/8/2018 10:28	10.1	24.8
4	1	10:29	10.6	24.8
4	2	10:30	10.6	24.8
4	2	10:31	10.4	23.3
4	3	10:32	10.4	23.3
4	3	10:33	10.4	21.3
Mean		10.4	23.9	
Max Deviation From Mean		0.4	2.6	
Max Deviation (%)		3.7%	10.9%	
Short Line?		OK	OK	
Single Point?		OK	OK	

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Initial Linearity (Strat Test)			Initial Response	Error	OK?	Strat Test	
Gas	Concentration	Value				Post Test	Error
CO ₂	Low	0	0	0.0%	Y	0	0.0%
	Mid	9.115	9	0.6%	Y	9.2	0.5%
	High	18.09	18.2	0.6%	Y		
SO ₂	Low	0	-0.1	0.1%	Y	0.1	0.1%
	Mid	60.15	59.4	0.5%	Y	59.4	0.5%
	High	147	146.4	0.4%	Y		

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		Calibration Error Tests		
Gas	Level	Gas Value	Analyzer Response	Calibration Error
CO₂	Low	0	0	0.0%
	Mid	9.115	9.1	-0.1%
	High	18.09	18.2	0.6%
SO₂	Low	0	-0.2	-0.1%
	Mid	60.15	59.7	-0.3%
	High	147	145.6	-1.0%
NO_x	Low	0	-0.2	-0.1%
	Mid	143.4	144.6	0.4%
	High	331.1	330.3	-0.2%
CO	Low	0	-0.8	-0.2%
	Mid	144.3	147.2	0.9%
	High	325.3	324	-0.4%

<2%

Post-Run System Calibration Error and Drift Assessments

Gas	Level	Run 1				Run 2				Run 3				Run 4				Run 5				
		Start Time		Run Length		Start Time		Run Length		Start Time		Run Length		Start Time		Run Length		Start Time		Run Length		
		Post Stop Time	Stop Time	Run Stop Time	Stop Time																	
CO ₂	Low	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
	Upscale	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
SO ₂	Low	0.0%	0.2	0.1%	-0.2	0.1%	-0.1%	0.3%	-0.1%	0.2	0.1%	0.3%	0.1%	-0.1%	-0.2	-0.1%	-0.1%	0.1	0.1%	0.1%	0.1%	
	Upscale	0.0%	58.5	-1.1%	58.6	1.1%	-1.1%	58.6	0.1%	58.9	-0.2%	58.3	0.9%	-0.2%	-0.2%	-0.9%	-0.7%	59.1	-0.7%	0.2%	0.2%	
NO _x	Low	0.0%	0.1	0.0%	0.0%	0.1	0.0%	0.0%	0.0%	0.2	0.1%	0.1%	-0.1%	-0.1%	0.1	0.0%	0.0%	0.0%	0	0.0%	0.0%	0.0%
	Upscale	0.0%	144.2	0.2%	145.4	0.6%	0.4%	145.5	0.6%	145.7	0.6%	145.5	0.6%	0.0%	0.6%	0.7%	0.7%	145.5	0.7%	0.6%	0.6%	
CO	Low	0.0%	1.2	0.4%	0.4%	0.2	0.1%	0.3%	0.1%	0.4	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.5%	-0.5%	
	Upscale	0.0%	148.5	1.3%	148.3	1.3%	1.3%	1.2%	0.1%	147.7	1.0%	0.2%	1.0%	0.2%	1.0%	1.5%	1.5%	1.5%	1.5%	1.5%	1.2%	0.3%
		\$5%	or ± 0.5	\$5%	or ± 0.5	\$5%	or ± 0.5	\$5%	\$5%	\$5%	or ± 0.5	or ± 0.5	or ± 0.5									

EPA Method TE-38.5(1): If you do not pass the post-run system bias check, then the run is invalid. You must pass another calibration error test and system bias check before repeating the run.

EPA Method TE-38.5(2): If the post-run bias check is passed, but the low or upscale drift exceeds the specification in Section 3.3, the run data are valid, but a three-point calibration error test and system bias check must be performed and passed before any more test runs are done.

Post-Run System Calibration t

Gas	Level	Run 6						Run 7						Run 8						Run 9								
		Start Time			10:28			Start Time			11:02			Start Time			11:36			Start Time			12:10					
		Run Length		21	Run Length		21	Run Length		21	Run Length		21	Run Length		21	Run Length		21	Run Length		21	Run Length		21			
CO ₂	Low	Initial Cal Error	0.0%	0.0%	Drift	0.0%	Initial Cal Error	0.0%	Response	0	Drift	0.0%	Initial Cal Error	0.0%	Response	0	Drift	0.0%	Initial Cal Error	0.0%	Response	0	Drift	0.0%	Initial Cal Error	0.0%	Response	0
CO ₂	Upscale	Initial Cal Error	2.1%	9.5	Drift	0.0%	Initial Cal Error	0.0%	Response	0	Drift	0.0%	Initial Cal Error	0.0%	Response	0	Drift	0.0%	Initial Cal Error	0.0%	Response	0	Drift	0.0%	Initial Cal Error	0.0%	Response	0
SO ₂	Low	Initial Cal Error	0.1%	-0.2	Drift	-0.1%	Initial Cal Error	0.2%	Response	0	Drift	0.0%	Initial Cal Error	0.1%	Response	0.0%	Drift	-0.1%	Initial Cal Error	0.1%	Response	0.0%	Drift	0.1%	Initial Cal Error	0.1%	Response	0.0%
SO ₂	Upscale	Initial Cal Error	-0.7%	58.9	Drift	-0.3%	Initial Cal Error	0.1%	Response	0	Drift	-0.5%	Initial Cal Error	-0.5%	Response	0.3%	Drift	-0.5%	Initial Cal Error	0.2%	Response	0.2%	Drift	0.5%	Initial Cal Error	0.3%	Response	0.3%
NO _x	Low	Initial Cal Error	0.0%	-0.2	Drift	-0.1%	Initial Cal Error	0.1%	Response	-0.2	Drift	-0.1%	Initial Cal Error	0.0%	Response	-0.1%	Drift	-0.1%	Initial Cal Error	0.0%	Response	-0.1%	Drift	-0.1%	Initial Cal Error	0.0%	Response	0.0%
NO _x	Upscale	Initial Cal Error	0.6%	146.4	Drift	0.5%	Initial Cal Error	0.3%	Response	147.9	Drift	1.4%	Initial Cal Error	0.5%	Response	1.4%	Drift	1.4%	Initial Cal Error	1.4%	Response	1.4%	Drift	1.4%	Initial Cal Error	1.4%	Response	1.4%
CO	Low	Initial Cal Error	-0.5%	-0.9	Drift	-0.3%	Initial Cal Error	0.2%	Response	-0.5	Drift	-0.2%	Initial Cal Error	0.1%	Response	-0.2%	Drift	-1.3	Initial Cal Error	-0.4%	Response	0.2%	Drift	-0.4%	Initial Cal Error	-0.1%	Response	0.3%
CO	Upscale	Initial Cal Error	1.2%	148.4	Drift	1.3%	Initial Cal Error	1.3%	Response	148.3	Drift	1.2%	Initial Cal Error	0.9%	Response	1.2%	Drift	1.9%	Initial Cal Error	0.7%	Response	1.9%	Drift	1.9%	Initial Cal Error	1.9%	Response	0.0%
S ⁶³	Low	Initial Cal Error	±0.5	±0.5	Drift	±0.5	Initial Cal Error	±0.5	Response	±0.5	Drift	±0.5	Initial Cal Error	±0.5	Response	±0.5	Drift	±0.5	Initial Cal Error	±0.5	Response	±0.5	Drift	±0.5	Initial Cal Error	±0.5	Response	±0.5

Time	CO2	SO2	NOx	CO	Calibration Error Tests
5/8/18 9:32:42	0.0	2.1	332.1	324.8	
5/8/18 9:32:52	0.0	2.0	331.1	324.6	
5/8/18 9:33:02	0.0	2.0	331.1	323.1	
5/8/18 9:33:12	0.0	1.9	330.8	323.2	
5/8/18 9:33:22	0.0	1.9	331.1	323.9	
5/8/18 9:33:32	0.0	1.7	331.2	323.0	
5/8/18 9:33:42	0.0	2.0	330.8	322.4	
5/8/18 9:33:52	0.0	1.8	331.0	320.6	
5/8/18 9:34:02	0.3	2.0	270.8	318.7	
5/8/18 9:34:12	1.8	1.2	211.0	287.6	
5/8/18 9:34:22	3.9	0.6	105.5	223.1	
5/8/18 9:34:32	6.7	0.1	1.6	136.1	
5/8/18 9:34:42	10.3	0.0	1.3	62.0	
5/8/18 9:34:52	14.9	-0.1	1.0	19.2	
5/8/18 9:35:02	18.8	-0.2	0.8	2.2	
5/8/18 9:35:12	19.4	-0.2	0.7	-1.5	
5/8/18 9:35:22	18.7	-0.2	0.7	-3.5	
5/8/18 9:35:32	18.1	0.1	0.5	-3.9	
5/8/18 9:35:42	18.1	-0.2	0.4	-5.4	
5/8/18 9:35:52	18.1	-0.2	0.6	-6.4	
5/8/18 9:36:02	18.1	0.0	0.5	-6.0	
5/8/18 9:36:12	18.2	-0.1	0.4	-4.3	
5/8/18 9:36:22	18.2	0.1	0.5	-2.4	
5/8/18 9:36:32	18.2	-0.1	0.3	-3.1	
5/8/18 9:36:42	18.2	0.0	0.1	-4.8	
5/8/18 9:36:52	18.2	0.1	-0.1	-5.8	
5/8/18 9:37:02	18.2	-0.3	-0.1	-7.0	
5/8/18 9:37:12	18.3	-0.1	0.0	-6.2	
5/8/18 9:37:22	18.2	-0.1	0.0	-5.3	
5/8/18 9:37:32	17.6	-0.4	-0.1	-3.3	
5/8/18 9:37:42	15.0	20.3	6.5	-1.5	
5/8/18 9:37:52	10.6	83.3	12.3	-0.3	
5/8/18 9:38:02	7.0	117.8	6.3	1.0	
5/8/18 9:38:12	4.3	135.2	0.2	0.6	
5/8/18 9:38:22	2.1	145.1	0.2	-0.4	
5/8/18 9:38:32	0.6	151.3	0.0	-1.7	
5/8/18 9:38:42	0.0	154.4	0.1	-1.5	
5/8/18 9:38:52	-0.1	157.4	0.1	-0.8	
5/8/18 9:39:02	-0.1	149.9	0.0	-0.4	
5/8/18 9:39:12	-0.1	147.7	-0.2	-0.2	
5/8/18 9:39:22	-0.1	147.8	0.2	-0.9	
5/8/18 9:39:32	-0.1	147.0	0.2	-1.9	
5/8/18 9:39:42	-0.1	147.6	0.0	-2.8	
5/8/18 9:39:52	-0.1	148.3	0.0	-1.6	
5/8/18 9:40:02	-0.1	148.2	0.0	0.3	
5/8/18 9:40:12	-0.1	148.3	0.2	1.2	
5/8/18 9:40:22	-0.1	150.3	0.1	0.4	
5/8/18 9:40:32	-0.1	148.3	0.0	-0.9	
5/8/18 9:40:42	-0.1	145.8	0.2	-2.0	
5/8/18 9:40:52	-0.1	146.2	-0.1	-3.1	
5/8/18 9:41:02	-0.1	146.1	-0.2	-2.5	
5/8/18 9:41:12	-0.1	147.1	0.1	-1.0	
5/8/18 9:41:22	-0.1	146.5	0.2	-1.0	
5/8/18 9:41:32	-0.1	146.3	0.2	-1.2	
5/8/18 9:41:42	-0.1	146.4	0.0	-1.2	
5/8/18 9:41:52	0.0	133.3	0.2	1.4	
5/8/18 9:42:02	0.1	83.1	71.7	16.7	
5/8/18 9:42:12	0.1	47.7	143.6	47.9	
5/8/18 9:42:22	0.1	28.7	143.9	88.0	
5/8/18 9:42:32	0.1	18.5	144.0	120.0	
5/8/18 9:42:42	0.0	12.0	144.5	136.8	
5/8/18 9:42:52	-0.1	8.1	144.5	142.3	
5/8/18 9:43:02	-0.1	5.5	144.5	143.3	
5/8/18 9:43:12	-0.1	3.9	144.3	142.2	
5/8/18 9:43:22	-0.1	3.0	144.7	142.3	
5/8/18 9:43:32	-0.1	2.4	144.8	142.8	
5/8/18 9:43:42	-0.1	1.9	144.7	145.1	
5/8/18 9:43:52	-0.1	1.8	144.5	144.7	
5/8/18 9:44:02	-0.1	1.5	144.6	144.8	
5/8/18 9:44:12	-0.1	1.3	145.0	143.2	
5/8/18 9:44:22	-0.1	1.2	144.6	142.7	
5/8/18 9:44:32	-0.1	1.3	144.4	142.3	

Time	CO2	SO2	NOx	CO
5/8/18 9:44:42	-0.1	1.3	144.5	142.5
5/8/18 9:44:52	-0.1	1.3	144.6	142.8
5/8/18 9:45:02	-0.1	1.2	144.9	144.0
5/8/18 9:45:12	-0.1	1.0	144.4	144.7
5/8/18 9:45:22	-0.1	1.2	144.8	144.8
5/8/18 9:45:32	-0.1	1.2	145.0	144.1
5/8/18 9:45:42	0.4	4.2	81.0	138.1
5/8/18 9:45:52	1.4	3.7	17.3	117.3
5/8/18 9:46:02	2.6	2.0	9.1	82.8
5/8/18 9:46:12	4.1	1.2	0.8	43.5
5/8/18 9:46:22	5.9	0.6	0.4	15.4
5/8/18 9:46:32	7.8	0.8	0.0	-0.9
5/8/18 9:46:42	9.0	0.5	0.1	-3.4
5/8/18 9:46:52	9.0	0.5	0.0	-3.5
5/8/18 9:47:02	9.0	0.1	0.3	-3.3
5/8/18 9:47:12	9.0	0.1	-0.1	-6.3
5/8/18 9:47:22	9.0	0.3	0.2	-7.1
5/8/18 9:47:32	9.0	-0.1	0.1	-6.6
5/8/18 9:47:42	9.0	-0.1	0.1	-5.6
5/8/18 9:47:52	9.0	0.1	-0.2	-5.3
5/8/18 9:48:02	8.8	0.0	0.1	-5.5
5/8/18 9:48:12	7.5	8.9	0.0	-4.6
5/8/18 9:48:22	5.5	30.7	0.1	-5.3
5/8/18 9:48:32	3.8	43.0	0.0	-4.1
5/8/18 9:48:42	2.4	49.6	0.1	-3.9
5/8/18 9:48:52	1.2	52.6	0.2	-2.5
5/8/18 9:49:02	0.3	54.6	0.1	-1.7
5/8/18 9:49:12	-0.1	56.7	0.0	-2.8
5/8/18 9:49:22	-0.1	57.3	-0.1	-5.1
5/8/18 9:49:32	-0.1	58.8	0.1	-6.3
5/8/18 9:49:42	-0.1	59.0	0.3	-5.7
5/8/18 9:49:52	-0.1	59.3	0.0	-5.2
5/8/18 9:50:02	-0.1	59.3	0.0	-5.7
5/8/18 9:50:12	-0.1	59.4	-0.1	-4.0
5/8/18 9:50:22	-0.1	59.5	0.0	-3.5
5/8/18 9:50:32	-0.1	59.5	0.0	-1.8
5/8/18 9:50:42	-0.1	59.6	-0.1	-3.1
5/8/18 9:50:52	-0.1	59.2	-0.4	-4.1
5/8/18 9:51:02	-0.1	59.0	-0.3	-4.9

Time	CO2	SO2	NOx	CO	
5/8/18 10:39:22	0.0	58.5	-0.2	-10.6	Strat Test
5/8/18 10:39:32	0.0	59.0	0.1	-9.7	PostCal
5/8/18 10:39:42	0.0	59.2	-0.1	-10.6	
5/8/18 10:39:52	0.0	59.4	-0.1	-11.2	
5/8/18 10:40:02	0.0	59.6	0.2	-12.3	
5/8/18 10:40:12	0.0	59.7	0.4	-11.6	
5/8/18 10:40:22	0.0	59.1	0.1	-10.8	
5/8/18 10:40:32	0.0	59.3	0.1	-9.2	
5/8/18 10:40:42	0.0	59.6	0.0	-9.1	
5/8/18 10:40:52	0.0	59.5	-0.1	-9.9	
5/8/18 10:41:02	0.0	59.3	0.0	-12.7	
5/8/18 10:41:12	0.0	59.3	0.1	-13.1	
5/8/18 10:41:22	-0.1	59.4	0.2	-13.3	
5/8/18 10:41:32	0.0	59.5	0.0	-13.5	
5/8/18 10:41:42	0.0	58.8	-0.1	-12.2	
5/8/18 10:41:52	0.0	58.7	0.1	-11.1	
5/8/18 10:42:02	0.0	59.2	0.0	-9.6	
5/8/18 10:42:12	0.1	58.7	0.0	-10.2	
5/8/18 10:42:22	0.7	57.5	45.4	-8.5	
5/8/18 10:42:32	1.8	47.7	90.6	-2.1	
5/8/18 10:42:42	3.2	39.2	95.6	8.1	
5/8/18 10:42:52	4.3	35.2	99.9	18.5	
5/8/18 10:43:02	4.7	44.4	50.1	22.3	
5/8/18 10:43:12	5.5	41.6	0.2	17.6	
5/8/18 10:43:22	6.1	22.7	0.5	7.0	
5/8/18 10:43:32	6.0	13.1	0.0	-3.5	
5/8/18 10:43:42	6.0	8.2	0.2	-10.5	
5/8/18 10:43:52	6.5	5.0	0.0	-14.3	
5/8/18 10:44:02	8.2	3.3	0.2	-15.5	
5/8/18 10:44:12	9.2	2.2	-0.1	-15.6	
5/8/18 10:44:22	9.2	1.3	0.0	-15.3	
5/8/18 10:44:32	9.2	0.7	-0.1	-14.8	
5/8/18 10:44:42	9.2	0.6	-0.1	-14.6	
5/8/18 10:44:52	9.2	0.2	-0.2	-14.0	
5/8/18 10:45:02	9.2	0.2	-0.2	-13.6	
5/8/18 10:45:12	9.3	-0.2	-0.3	-14.3	
5/8/18 10:45:22	9.2	0.1	-0.2	-14.8	
5/8/18 10:45:32	9.2	0.2	-0.2	-15.7	
5/8/18 10:45:42	8.9	-0.1	-0.2	-13.9	
5/8/18 10:45:52	7.5	0.4	-0.4	-12.7	

Time	CO2	SO2	NOx	CO	Calibration Error Tests
5/9/18 7:07:17	0.0	-0.3	-0.2	-0.3	
5/9/18 7:07:27	0.0	-0.1	-0.3	-0.8	
5/9/18 7:07:37	0.0	-0.3	-0.3	-1.9	
5/9/18 7:07:47	0.0	-0.3	-0.1	-2.5	
5/9/18 7:07:57	0.0	-0.2	-0.2	-1.9	
5/9/18 7:08:07	-0.1	-0.1	-0.3	-0.8	
5/9/18 7:08:17	0.0	-0.2	-0.1	0.0	
5/9/18 7:08:27	0.3	-0.2	-0.2	0.5	
5/9/18 7:08:37	1.7	0.3	-0.3	0.1	
5/9/18 7:08:47	3.8	0.1	-0.3	-1.5	
5/9/18 7:08:57	6.4	-0.2	0.0	-3.8	
5/9/18 7:09:07	10.0	0.0	-0.3	-5.3	
5/9/18 7:09:17	14.4	-0.3	-0.1	-4.2	
5/9/18 7:09:27	18.5	-0.1	-0.1	-3.8	
5/9/18 7:09:37	19.0	0.0	0.0	-2.6	
5/9/18 7:09:47	19.0	-0.2	-0.3	-2.9	
5/9/18 7:09:57	18.7	-0.1	-0.2	-3.6	
5/9/18 7:10:07	18.1	0.0	-0.3	-4.3	
5/9/18 7:10:17	18.2	-0.3	-0.3	-5.2	
5/9/18 7:10:27	18.2	-0.1	0.0	-5.8	
5/9/18 7:10:37	18.2	-0.3	-0.2	-6.5	
5/9/18 7:10:47	18.2	-0.4	-0.1	-5.4	
5/9/18 7:10:57	18.2	-0.4	-0.1	-5.0	
5/9/18 7:11:07	18.2	-0.2	-0.1	-5.1	
5/9/18 7:11:17	18.2	-0.1	-0.3	-4.5	
5/9/18 7:11:27	18.2	-0.2	-0.1	-3.3	
5/9/18 7:11:37	16.0	-0.1	95.8	4.3	
5/9/18 7:11:47	11.7	0.6	255.9	38.3	
5/9/18 7:11:57	8.0	1.2	329.3	106.0	
5/9/18 7:12:07	5.0	1.7	345.8	195.6	
5/9/18 7:12:17	2.7	1.9	354.5	271.8	
5/9/18 7:12:27	1.0	1.8	355.7	319.0	
5/9/18 7:12:37	0.2	2.0	332.6	338.9	
5/9/18 7:12:47	0.1	2.0	328.6	344.3	
5/9/18 7:12:57	0.0	2.0	328.5	344.3	
5/9/18 7:13:07	0.0	1.9	328.5	340.6	
5/9/18 7:13:17	0.0	2.1	331.4	337.7	
5/9/18 7:13:27	0.0	1.8	331.0	336.0	
5/9/18 7:13:37	0.0	2.0	330.4	325.9	
5/9/18 7:13:47	0.0	1.9	330.5	326.5	
5/9/18 7:13:57	0.0	1.7	330.3	326.6	
5/9/18 7:14:07	0.0	1.7	330.2	325.5	
5/9/18 7:14:17	0.0	1.8	330.5	324.2	
5/9/18 7:14:27	0.0	2.0	330.2	323.7	
5/9/18 7:14:37	0.0	1.8	330.3	323.2	
5/9/18 7:14:47	0.0	1.6	330.4	323.7	
5/9/18 7:14:57	0.0	1.9	330.7	323.9	
5/9/18 7:15:07	0.1	8.1	330.9	320.0	
5/9/18 7:15:17	0.1	44.2	232.2	290.8	
5/9/18 7:15:27	0.1	90.5	67.8	229.1	
5/9/18 7:15:37	0.1	116.5	1.4	145.8	
5/9/18 7:15:47	0.1	129.9	0.9	72.8	
5/9/18 7:15:57	0.1	137.0	0.5	25.8	
5/9/18 7:16:07	0.0	141.5	0.5	5.8	
5/9/18 7:16:17	0.0	144.9	0.4	1.1	
5/9/18 7:16:27	0.0	146.8	0.5	2.6	
5/9/18 7:16:37	0.0	148.3	0.0	3.9	
5/9/18 7:16:47	0.0	149.8	-0.1	3.2	
5/9/18 7:16:57	0.0	151.4	0.3	0.8	
5/9/18 7:17:07	0.0	152.9	0.1	-0.6	
5/9/18 7:17:17	0.0	153.4	-0.1	-1.6	
5/9/18 7:17:27	0.0	147.2	0.2	-1.7	
5/9/18 7:17:37	0.0	146.4	0.1	-1.9	
5/9/18 7:17:47	0.0	145.9	0.1	-0.8	
5/9/18 7:17:57	0.0	144.9	0.1	0.6	
5/9/18 7:18:07	0.0	143.8	0.1	1.0	
5/9/18 7:18:17	0.0	143.6	-0.1	0.6	
5/9/18 7:18:27	-0.1	143.2	0.2	-0.7	
5/9/18 7:18:37	-0.1	143.2	0.0	-0.8	
5/9/18 7:18:47	-0.1	143.0	-0.4	-0.5	
5/9/18 7:18:57	-0.1	143.0	0.9	-0.1	
5/9/18 7:19:07	0.0	125.9	3.0	6.3	

Time	CO2	SO2	NOx	CO
5/9/18 7:19:17	0.0	83.0	45.5	25.7
5/9/18 7:19:27	0.0	47.4	115.8	59.6
5/9/18 7:19:37	0.0	29.2	144.2	97.8
5/9/18 7:19:47	0.0	18.5	144.2	126.3
5/9/18 7:19:57	0.0	11.9	144.5	140.9
5/9/18 7:20:07	-0.1	8.2	144.7	146.2
5/9/18 7:20:17	-0.1	5.6	144.4	146.7
5/9/18 7:20:27	0.0	4.0	144.8	146.7
5/9/18 7:20:37	-0.1	2.8	144.9	147.5
5/9/18 7:20:47	0.0	2.3	144.7	147.5
5/9/18 7:20:57	-0.1	1.8	144.4	147.8
5/9/18 7:21:07	0.0	1.8	144.6	146.8
5/9/18 7:21:17	-0.1	1.3	144.8	146.2
5/9/18 7:21:27	-0.1	1.4	145.2	144.6
5/9/18 7:21:37	0.0	1.2	145.4	144.9
5/9/18 7:21:47	0.4	3.4	145.6	141.1
5/9/18 7:21:57	1.4	4.0	102.1	124.0
5/9/18 7:22:07	2.6	2.1	29.4	91.8
5/9/18 7:22:17	4.1	1.1	0.5	52.7
5/9/18 7:22:27	5.9	0.9	0.2	22.0
5/9/18 7:22:37	8.1	0.5	0.2	4.5
5/9/18 7:22:47	9.2	0.2	0.1	-2.5
5/9/18 7:22:57	9.2	0.2	0.2	-4.0
5/9/18 7:23:07	9.2	0.2	0.3	-3.0
5/9/18 7:23:17	9.1	0.3	0.3	-2.4
5/9/18 7:23:27	9.1	0.1	0.1	-2.6
5/9/18 7:23:37	9.1	0.3	0.2	-2.3
5/9/18 7:23:47	9.1	0.1	-0.1	-2.9
5/9/18 7:23:57	9.1	-0.1	-0.3	-3.4
5/9/18 7:24:07	9.1	-0.4	-0.3	-4.7
5/9/18 7:24:17	9.0	0.6	2.8	-3.9
5/9/18 7:24:27	7.1	13.1	8.0	-2.9
5/9/18 7:24:37	5.1	32.3	6.9	-0.8
5/9/18 7:24:47	3.5	43.6	2.2	0.2
5/9/18 7:24:57	2.1	49.4	0.3	0.7
5/9/18 7:25:07	1.0	52.8	0.0	-0.5
5/9/18 7:25:17	0.2	55.0	-0.4	-1.5
5/9/18 7:25:27	0.0	56.4	-0.2	-2.2
5/9/18 7:25:37	0.0	57.1	-0.2	-1.5
5/9/18 7:25:47	0.0	57.9	-0.2	-0.1
5/9/18 7:25:57	0.0	57.8	-0.4	0.2
5/9/18 7:26:07	0.0	57.9	-0.3	0.0
5/9/18 7:26:17	0.0	57.9	-0.3	-0.7
5/9/18 7:26:27	0.0	58.1	-0.3	-1.6
5/9/18 7:26:37	0.0	58.5	-0.2	-2.4
5/9/18 7:26:47	0.0	59.1	-0.3	-3.1
5/9/18 7:26:57	-0.1	59.9	-0.2	-3.6
5/9/18 7:27:07	-0.1	60.3	-0.1	-3.0
5/9/18 7:27:17	-0.1	60.1	-0.1	-1.9
5/9/18 7:27:27	0.0	59.2	0.0	-0.6
5/9/18 7:27:37	0.0	58.8	-0.3	-0.2

Time	CO2	SO2	NOx	CO	R1 PostCal
5/9/18 7:57:47	0.0	58.0	0.1	3.0	
5/9/18 7:57:57	0.0	58.5	0.0	4.0	
5/9/18 7:58:07	0.0	58.6	0.1	3.5	
5/9/18 7:58:17	0.0	58.5	0.1	2.9	
5/9/18 7:58:27	0.0	58.9	0.0	1.9	
5/9/18 7:58:37	0.0	58.0	0.2	0.7	
5/9/18 7:58:47	0.0	57.6	0.1	0.5	
5/9/18 7:58:57	0.0	58.1	0.0	0.1	
5/9/18 7:59:07	0.0	58.4	0.0	0.6	
5/9/18 7:59:17	0.0	58.5	0.1	1.9	
5/9/18 7:59:27	0.0	58.9	0.0	2.7	
5/9/18 7:59:37	0.0	58.9	-0.2	2.3	
5/9/18 7:59:47	0.5	51.5	-0.1	1.4	
5/9/18 7:59:57	1.5	34.0	-0.2	1.0	
5/9/18 8:00:07	2.7	18.7	-0.2	1.5	
5/9/18 8:00:17	4.2	10.8	-0.3	1.8	
5/9/18 8:00:27	6.0	6.7	-0.2	1.7	
5/9/18 8:00:37	8.3	3.9	-0.2	0.6	
5/9/18 8:00:47	9.3	2.4	-0.1	-1.0	
5/9/18 8:00:57	9.5	1.6	-0.3	-1.2	
5/9/18 8:01:07	9.6	1.1	-0.4	-1.2	
5/9/18 8:01:17	9.6	0.9	-0.3	-1.0	
5/9/18 8:01:27	9.6	0.4	-0.1	-0.8	
5/9/18 8:01:37	9.4	0.1	-0.1	-1.1	
5/9/18 8:01:47	9.4	0.4	0.0	-0.9	
5/9/18 8:01:57	9.3	0.1	-0.2	-0.2	
5/9/18 8:02:07	9.2	0.2	-0.4	-0.1	
5/9/18 8:02:17	9.0	0.2	-0.3	-0.7	
5/9/18 8:02:27	9.0	0.0	-0.3	-1.9	
5/9/18 8:02:37	8.1	0.8	36.8	0.1	
5/9/18 8:02:47	6.2	2.1	98.5	15.5	
5/9/18 8:02:57	4.4	1.3	129.3	45.7	
5/9/18 8:03:07	2.9	1.0	139.6	85.7	
5/9/18 8:03:17	1.7	1.2	144.0	119.1	
5/9/18 8:03:27	0.7	1.1	144.0	139.0	
5/9/18 8:03:37	0.1	1.0	144.1	145.8	
5/9/18 8:03:47	0.0	0.8	144.4	146.8	
5/9/18 8:03:57	0.0	0.9	144.2	146.4	
5/9/18 8:04:07	0.0	0.7	144.3	148.4	
5/9/18 8:04:17	0.0	0.8	144.2	149.2	
5/9/18 8:04:27	0.0	0.7	144.5	150.5	
5/9/18 8:04:37	0.0	0.8	144.3	149.9	

Time	CO2	SO2	NOx	CO	R2 PostCal
5/9/18 8:32:17	0.2	1.7	145.5	146.0	
5/9/18 8:32:27	0.0	1.5	145.5	147.9	
5/9/18 8:32:37	0.1	1.2	145.4	147.8	
5/9/18 8:32:47	0.0	1.0	145.2	148.7	
5/9/18 8:32:57	0.0	0.7	145.5	148.3	
5/9/18 8:33:07	0.0	0.8	145.4	148.8	
5/9/18 8:33:17	0.0	0.9	145.3	148.1	
5/9/18 8:33:27	0.0	0.7	145.3	148.0	
5/9/18 8:33:37	0.0	0.8	145.7	148.4	
5/9/18 8:33:47	0.0	0.7	145.4	148.9	
5/9/18 8:33:57	0.7	0.8	102.3	142.3	
5/9/18 8:34:07	1.7	0.5	30.4	121.5	
5/9/18 8:34:17	3.0	0.3	1.8	86.4	
5/9/18 8:34:27	4.6	0.1	0.7	48.0	
5/9/18 8:34:37	6.5	-0.1	0.3	18.0	
5/9/18 8:34:47	8.7	-0.2	0.4	2.3	
5/9/18 8:34:57	9.4	-0.1	0.4	-3.2	
5/9/18 8:35:07	9.5	-0.1	0.5	-2.5	
5/9/18 8:35:17	9.5	-0.3	0.3	-1.2	
5/9/18 8:35:27	9.4	-0.1	0.1	-0.9	
5/9/18 8:35:37	9.4	0.0	0.1	-1.3	
5/9/18 8:35:47	9.4	-0.2	0.2	-2.3	
5/9/18 8:35:57	9.3	-0.3	0.2	-3.2	
5/9/18 8:36:07	9.3	-0.2	0.0	-4.1	
5/9/18 8:36:17	9.3	-0.2	0.0	-3.5	
5/9/18 8:36:27	9.2	0.2	0.2	-1.7	
5/9/18 8:36:37	7.4	11.1	0.2	-0.1	
5/9/18 8:36:47	5.5	29.7	-0.1	0.7	
5/9/18 8:36:57	3.8	42.1	0.1	0.9	
5/9/18 8:37:07	2.3	48.1	0.0	0.6	
5/9/18 8:37:17	1.2	52.0	0.4	0.7	
5/9/18 8:37:27	0.2	54.4	0.1	-0.5	
5/9/18 8:37:37	0.0	56.2	0.2	-1.0	
5/9/18 8:37:47	0.0	56.9	0.1	-0.3	
5/9/18 8:37:57	0.0	57.5	0.0	1.4	
5/9/18 8:38:07	0.0	57.5	-0.2	2.2	
5/9/18 8:38:17	0.0	58.3	-0.2	2.3	
5/9/18 8:38:27	0.0	58.8	-0.1	1.8	
5/9/18 8:38:37	0.0	58.6	-0.2	0.9	
5/9/18 8:38:47	0.0	58.6	-0.4	0.0	
5/9/18 8:38:57	0.0	58.6	-0.2	0.1	
5/9/18 8:39:07	0.0	58.3	-0.2	0.7	

Time	CO2	SO2	NOx	CO	R3 PostCal
5/9/18 9:07:57	0.0	58.5	-0.2	0.4	
5/9/18 9:08:07	0.0	58.7	-0.2	-0.7	
5/9/18 9:08:17	0.0	59.2	-0.1	-1.2	
5/9/18 9:08:27	0.0	59.1	-0.4	-1.8	
5/9/18 9:08:37	0.0	59.4	-0.2	-1.4	
5/9/18 9:08:47	0.0	60.5	-0.4	-0.7	
5/9/18 9:08:57	0.0	60.8	-0.2	0.2	
5/9/18 9:09:07	0.0	60.4	0.0	0.9	
5/9/18 9:09:17	0.0	59.9	-0.2	0.2	
5/9/18 9:09:27	0.1	58.7	-0.3	-0.5	
5/9/18 9:09:37	0.8	47.4	-0.2	-1.7	
5/9/18 9:09:47	1.9	27.6	-0.1	-2.0	
5/9/18 9:09:57	3.3	15.6	-0.2	-2.2	
5/9/18 9:10:07	4.9	9.1	-0.5	-2.3	
5/9/18 9:10:17	6.8	5.5	-0.4	-2.7	
5/9/18 9:10:27	8.9	3.4	-0.4	-2.7	
5/9/18 9:10:37	9.3	2.3	-0.4	-3.2	
5/9/18 9:10:47	9.3	1.4	-0.3	-3.7	
5/9/18 9:10:57	9.3	0.8	-0.2	-4.1	
5/9/18 9:11:07	9.3	0.5	-0.1	-4.0	
5/9/18 9:11:17	9.3	0.3	-0.1	-3.6	
5/9/18 9:11:27	9.3	0.1	-0.2	-2.8	
5/9/18 9:11:37	9.3	0.4	-0.2	-2.5	
5/9/18 9:11:47	9.3	0.0	-0.2	-3.3	
5/9/18 9:11:57	9.3	0.1	-0.2	-3.3	
5/9/18 9:12:07	9.3	0.0	-0.1	-3.4	
5/9/18 9:12:17	8.9	0.8	22.6	-2.9	
5/9/18 9:12:27	6.9	1.4	61.0	7.8	
5/9/18 9:12:37	5.0	1.4	97.0	34.2	
5/9/18 9:12:47	3.4	1.1	131.3	73.2	
5/9/18 9:12:57	2.0	1.1	145.0	109.7	
5/9/18 9:13:07	0.9	0.9	145.3	132.8	
5/9/18 9:13:17	0.1	0.9	146.0	143.3	
5/9/18 9:13:27	0.0	0.8	147.0	146.0	
5/9/18 9:13:37	0.0	0.8	149.4	147.5	
5/9/18 9:13:47	0.0	0.9	152.0	149.5	
5/9/18 9:13:57	0.0	0.9	150.9	151.4	
5/9/18 9:14:07	0.0	0.8	147.8	153.0	
5/9/18 9:14:17	0.0	0.9	146.4	153.2	
5/9/18 9:14:27	0.0	0.9	145.7	151.0	
5/9/18 9:14:37	0.0	0.8	145.2	148.9	
5/9/18 9:14:47	0.0	0.9	145.1	147.9	
5/9/18 9:14:57	0.0	1.0	145.2	147.3	
5/9/18 9:15:07	0.0	0.8	145.0	147.0	
5/9/18 9:15:17	0.0	0.9	144.9	147.2	

Time	CO2	SO2	NOx	CO	R4 PostCal
5/9/18 9:41:47	1.2	2.9	145.5	137.3	
5/9/18 9:41:57	0.2	2.1	145.6	144.1	
5/9/18 9:42:07	0.1	1.6	145.4	146.0	
5/9/18 9:42:17	0.0	1.3	145.9	146.3	
5/9/18 9:42:27	0.0	1.3	146.3	147.3	
5/9/18 9:42:37	0.0	1.1	148.6	148.7	
5/9/18 9:42:47	0.0	0.7	151.6	149.8	
5/9/18 9:42:57	0.0	0.8	151.3	151.3	
5/9/18 9:43:07	0.0	1.0	149.5	151.5	
5/9/18 9:43:17	0.0	0.9	148.2	151.0	
5/9/18 9:43:27	0.0	1.0	146.7	149.6	
5/9/18 9:43:37	0.0	0.7	146.1	149.3	
5/9/18 9:43:47	0.0	0.5	146.0	149.3	
5/9/18 9:43:57	0.0	0.8	132.6	148.8	
5/9/18 9:44:07	0.8	0.7	110.3	139.1	
5/9/18 9:44:17	1.9	0.3	71.0	113.9	
5/9/18 9:44:27	3.2	0.1	20.5	75.3	
5/9/18 9:44:37	4.8	0.0	0.3	37.7	
5/9/18 9:44:47	6.7	-0.2	0.1	12.5	
5/9/18 9:44:57	8.9	0.1	0.1	0.4	
5/9/18 9:45:07	9.3	-0.2	0.3	-3.2	
5/9/18 9:45:17	9.3	-0.3	0.2	-3.4	
5/9/18 9:45:27	9.3	-0.2	0.3	-3.5	
5/9/18 9:45:37	9.3	-0.3	0.0	-4.4	
5/9/18 9:45:47	9.3	-0.1	0.1	-5.6	
5/9/18 9:45:57	9.3	-0.4	-0.2	-5.7	
5/9/18 9:46:07	9.3	-0.3	-0.2	-5.2	
5/9/18 9:46:17	9.3	-0.3	0.0	-3.9	
5/9/18 9:46:27	9.3	-0.2	-0.3	-2.6	
5/9/18 9:46:37	9.3	-0.2	-0.2	-2.1	
5/9/18 9:46:47	9.3	-0.3	-0.2	-2.5	
5/9/18 9:46:57	9.3	-0.1	2.1	-3.0	
5/9/18 9:47:07	7.6	9.5	6.0	-4.0	
5/9/18 9:47:17	5.6	28.8	5.2	-3.7	
5/9/18 9:47:27	3.9	43.1	1.4	-2.3	
5/9/18 9:47:37	2.5	49.9	-0.5	-0.8	
5/9/18 9:47:47	1.4	54.1	-0.4	0.1	
5/9/18 9:47:57	0.4	56.7	-0.4	1.1	
5/9/18 9:48:07	0.1	57.6	-0.2	0.7	
5/9/18 9:48:17	0.1	57.8	-0.2	-0.1	
5/9/18 9:48:27	0.1	58.1	-0.1	-1.8	
5/9/18 9:48:37	0.1	58.6	-0.3	-2.6	
5/9/18 9:48:47	0.0	58.7	-0.3	-1.9	
5/9/18 9:48:57	-0.1	59.1	-0.3	-0.7	
5/9/18 9:49:07	-0.1	59.0	-0.2	0.0	
5/9/18 9:49:17	-0.1	58.5	0.0	-0.5	
5/9/18 9:49:27	-0.1	58.9	0.0	-1.4	

Time	CO2	SO2	NOx	CO	
5/9/18 10:17:57	0.0	59.2	0.1	-0.5	
5/9/18 10:18:07	0.0	59.3	0.0	-1.3	
5/9/18 10:18:17	0.0	59.1	-0.1	-1.7	
5/9/18 10:18:27	0.0	59.0	-0.1	-1.9	
5/9/18 10:18:37	0.0	59.0	-0.2	-2.3	
5/9/18 10:18:47	0.0	59.3	0.1	-2.3	
5/9/18 10:18:57	0.0	59.5	-0.1	-1.2	
5/9/18 10:19:07	0.0	59.2	-0.3	-1.0	
5/9/18 10:19:17	0.0	59.4	-0.2	-1.0	
5/9/18 10:19:27	0.5	52.9	-0.3	-2.3	
5/9/18 10:19:37	1.4	34.9	-0.2	-2.7	
5/9/18 10:19:47	2.7	18.8	-0.1	-4.2	
5/9/18 10:19:57	4.1	11.0	-0.1	-4.9	
5/9/18 10:20:07	5.9	6.6	-0.4	-5.9	
5/9/18 10:20:17	8.1	4.5	-0.2	-5.1	
5/9/18 10:20:27	9.2	3.0	0.0	-4.4	
5/9/18 10:20:37	9.3	1.9	-0.1	-4.1	
5/9/18 10:20:47	9.3	1.2	-0.3	-4.1	
5/9/18 10:20:57	9.3	0.9	-0.1	-4.6	
5/9/18 10:21:07	9.3	0.4	-0.2	-4.7	
5/9/18 10:21:17	9.3	0.4	-0.1	-4.8	
5/9/18 10:21:27	9.4	0.5	-0.3	-4.2	
5/9/18 10:21:37	9.5	0.1	-0.2	-3.3	
5/9/18 10:21:47	9.5	0.2	-0.1	-3.4	
5/9/18 10:21:57	9.5	0.0	-0.3	-3.8	
5/9/18 10:22:07	9.5	0.1	-0.1	-4.4	
5/9/18 10:22:17	9.5	0.4	-0.1	-4.7	
5/9/18 10:22:27	9.1	0.9	-0.2	-4.2	
5/9/18 10:22:37	7.0	1.6	42.8	6.3	
5/9/18 10:22:47	5.0	1.7	115.2	32.2	
5/9/18 10:22:57	3.4	1.3	144.4	71.1	
5/9/18 10:23:07	2.0	1.3	145.2	107.7	
5/9/18 10:23:17	0.9	1.0	145.5	131.5	
5/9/18 10:23:27	0.1	1.2	145.5	142.3	
5/9/18 10:23:37	0.0	0.9	145.9	145.7	
5/9/18 10:23:47	0.0	1.0	145.6	146.0	
5/9/18 10:23:57	0.0	0.9	145.4	147.3	
5/9/18 10:24:07	0.0	0.9	145.5	148.2	
5/9/18 10:24:17	0.0	0.8	145.3	148.7	
5/9/18 10:24:27	0.0	0.6	145.4	149.0	
5/9/18 10:24:37	0.0	0.9	145.6	147.9	

R5 PostCal

Time	CO2	SO2	NOx	CO	
5/9/18 10:52:17	0.0	1.4	146.4	146.8	R6 PostCal
5/9/18 10:52:27	0.0	1.1	146.4	147.1	
5/9/18 10:52:37	0.0	1.1	146.5	148.1	
5/9/18 10:52:47	0.1	0.9	146.4	149.2	
5/9/18 10:52:57	0.0	1.1	146.2	149.0	
5/9/18 10:53:07	0.1	0.8	146.1	148.8	
5/9/18 10:53:17	0.0	0.9	146.3	148.3	
5/9/18 10:53:27	0.0	0.6	146.3	147.8	
5/9/18 10:53:37	0.0	0.6	144.3	146.6	
5/9/18 10:53:47	0.6	0.7	141.2	140.2	
5/9/18 10:53:57	1.6	0.4	97.8	120.8	
5/9/18 10:54:07	2.9	0.1	28.2	87.2	
5/9/18 10:54:17	4.5	0.0	0.4	48.7	
5/9/18 10:54:27	6.3	0.1	0.4	18.6	
5/9/18 10:54:37	8.5	-0.2	0.3	2.0	
5/9/18 10:54:47	9.2	-0.2	0.2	-4.3	
5/9/18 10:54:57	9.3	-0.1	0.1	-5.7	
5/9/18 10:55:07	9.4	0.0	0.3	-4.8	
5/9/18 10:55:17	9.4	-0.1	-0.1	-3.8	
5/9/18 10:55:27	9.5	-0.2	-0.4	-2.9	
5/9/18 10:55:37	9.5	-0.2	-0.3	-2.8	
5/9/18 10:55:47	9.5	-0.3	-0.2	-3.3	
5/9/18 10:55:57	9.5	-0.2	-0.2	-4.4	
5/9/18 10:56:07	9.5	-0.2	-0.1	-5.8	
5/9/18 10:56:17	9.5	-0.1	-0.4	-5.2	
5/9/18 10:56:27	9.4	0.0	-0.3	-4.8	
5/9/18 10:56:37	9.0	1.9	2.8	-2.7	
5/9/18 10:56:47	6.9	16.5	8.6	-2.7	
5/9/18 10:56:57	5.0	35.3	7.5	-2.9	
5/9/18 10:57:07	3.3	45.4	2.1	-2.7	
5/9/18 10:57:17	2.0	50.9	-0.2	-2.4	
5/9/18 10:57:27	0.9	53.8	-0.3	-2.2	
5/9/18 10:57:37	0.1	55.4	-0.2	-1.6	
5/9/18 10:57:47	0.0	56.6	-0.3	-0.5	
5/9/18 10:57:57	0.0	57.3	-0.1	-0.3	
5/9/18 10:58:07	0.0	58.1	-0.3	-0.8	
5/9/18 10:58:17	0.0	58.6	-0.3	-1.4	
5/9/18 10:58:27	0.0	59.0	-0.1	-1.2	
5/9/18 10:58:37	0.0	58.7	-0.3	-0.9	
5/9/18 10:58:47	0.0	58.3	-0.4	-0.9	
5/9/18 10:58:57	0.0	58.8	-0.2	-1.2	
5/9/18 10:59:07	0.0	59.2	-0.4	-0.3	
5/9/18 10:59:17	0.0	59.0	-0.2	0.1	
5/9/18 10:59:27	0.0	58.7	-0.2	-0.9	
5/9/18 10:59:37	0.0	58.6	-0.1	-1.9	

Time	CO2	SO2	NOx	CO	R7 PostCal
5/9/18 11:25:47	0.0	58.6	-0.2	0.7	
5/9/18 11:25:57	0.0	59.1	-0.3	1.0	
5/9/18 11:26:07	0.0	59.3	-0.3	0.1	
5/9/18 11:26:17	0.0	59.6	-0.1	-0.9	
5/9/18 11:26:27	0.0	59.8	-0.4	-1.6	
5/9/18 11:26:37	0.0	59.6	-0.1	-2.4	
5/9/18 11:26:47	0.0	59.7	-0.3	-2.9	
5/9/18 11:26:57	0.0	59.6	-0.4	-2.7	
5/9/18 11:27:07	0.3	56.6	-0.2	-1.4	
5/9/18 11:27:17	1.2	41.7	-0.2	-0.9	
5/9/18 11:27:27	2.3	23.0	-0.1	-1.9	
5/9/18 11:27:37	3.8	12.8	-0.1	-3.5	
5/9/18 11:27:47	5.5	7.5	-0.2	-4.5	
5/9/18 11:27:57	7.6	4.7	0.1	-4.8	
5/9/18 11:28:07	9.2	2.8	0.0	-3.7	
5/9/18 11:28:17	9.4	1.6	-0.1	-2.1	
5/9/18 11:28:27	9.4	1.3	-0.3	-1.6	
5/9/18 11:28:37	9.4	1.0	0.1	-2.9	
5/9/18 11:28:47	9.4	0.3	-0.1	-3.8	
5/9/18 11:28:57	9.4	0.4	-0.3	-4.1	
5/9/18 11:29:07	9.5	0.2	-0.1	-4.5	
5/9/18 11:29:17	9.5	0.0	-0.1	-3.8	
5/9/18 11:29:27	9.6	0.3	-0.3	-3.6	
5/9/18 11:29:37	9.6	-0.1	-0.3	-3.1	
5/9/18 11:29:47	9.6	-0.2	-0.5	-2.7	
5/9/18 11:29:57	9.6	0.2	0.0	-2.8	
5/9/18 11:30:07	9.6	-0.2	-0.2	-2.9	
5/9/18 11:30:17	9.3	0.6	18.4	-3.0	
5/9/18 11:30:27	7.2	1.7	49.1	7.2	
5/9/18 11:30:37	5.2	2.1	87.2	32.7	
5/9/18 11:30:47	3.5	1.4	130.1	71.2	
5/9/18 11:30:57	2.1	1.2	147.6	109.0	
5/9/18 11:31:07	1.0	1.2	147.3	134.4	
5/9/18 11:31:17	0.2	0.9	147.5	145.5	
5/9/18 11:31:27	0.0	0.9	147.8	147.8	
5/9/18 11:31:37	0.0	0.8	148.0	148.5	
5/9/18 11:31:47	0.0	0.9	147.9	149.1	
5/9/18 11:31:57	0.0	0.7	147.7	149.9	
5/9/18 11:32:07	0.0	0.8	148.0	149.9	
5/9/18 11:32:17	0.0	0.8	148.2	149.2	
5/9/18 11:32:27	0.0	0.6	147.7	149.1	
5/9/18 11:32:37	0.0	1.0	147.8	148.1	
5/9/18 11:32:47	0.0	0.8	148.1	147.4	
5/9/18 11:32:57	0.0	1.0	147.9	147.9	

Time	CO2	SO2	NOx	CO	R8 PostCal
5/9/18 11:59:17	0.3	2.4	149.5	149.3	
5/9/18 11:59:27	0.1	1.5	149.6	152.3	
5/9/18 11:59:37	0.1	1.1	149.2	153.6	
5/9/18 11:59:47	0.0	1.0	149.2	153.6	
5/9/18 11:59:57	0.0	0.9	149.2	152.1	
5/9/18 12:00:07	0.0	1.0	149.4	150.2	
5/9/18 12:00:17	0.0	0.8	149.2	149.7	
5/9/18 12:00:27	0.0	0.8	149.3	150.2	
5/9/18 12:00:37	0.0	0.9	150.0	150.3	
5/9/18 12:00:47	0.0	0.9	150.2	150.8	
5/9/18 12:00:57	0.0	0.8	150.3	151.7	
5/9/18 12:01:07	0.0	0.8	150.5	151.9	
5/9/18 12:01:17	0.0	0.9	149.9	152.2	
5/9/18 12:01:27	0.0	0.6	149.9	151.6	
5/9/18 12:01:37	0.0	1.1	149.5	151.0	
5/9/18 12:01:47	0.5	0.7	148.5	144.9	
5/9/18 12:01:57	1.6	0.3	103.8	126.2	
5/9/18 12:02:07	2.8	0.0	30.0	92.0	
5/9/18 12:02:17	4.4	0.0	0.5	52.8	
5/9/18 12:02:27	6.2	-0.2	0.3	21.8	
5/9/18 12:02:37	8.5	-0.3	0.1	3.9	
5/9/18 12:02:47	9.4	0.1	0.2	-3.5	
5/9/18 12:02:57	9.5	-0.2	0.0	-5.3	
5/9/18 12:03:07	9.6	-0.1	0.2	-5.8	
5/9/18 12:03:17	9.6	-0.2	0.3	-4.8	
5/9/18 12:03:27	9.7	-0.3	0.1	-4.6	
5/9/18 12:03:37	9.7	0.0	0.0	-3.2	
5/9/18 12:03:47	9.7	-0.4	-0.2	-3.9	
5/9/18 12:03:57	9.7	-0.1	-0.2	-4.0	
5/9/18 12:04:07	9.7	-0.2	-0.3	-4.1	
5/9/18 12:04:17	9.6	-0.2	-0.1	-3.3	
5/9/18 12:04:27	9.6	-0.1	-0.3	-2.7	
5/9/18 12:04:37	9.6	-0.2	-0.2	-2.0	
5/9/18 12:04:47	9.6	0.0	-0.1	-2.1	
5/9/18 12:04:57	9.5	0.1	2.8	-2.4	
5/9/18 12:05:07	7.5	11.5	8.3	-3.0	
5/9/18 12:05:17	5.5	31.4	7.0	-3.3	
5/9/18 12:05:27	3.8	44.2	2.0	-4.0	
5/9/18 12:05:37	2.3	50.5	-0.1	-4.4	
5/9/18 12:05:47	1.2	54.3	-0.3	-3.3	
5/9/18 12:05:57	0.2	56.4	-0.1	-1.5	
5/9/18 12:06:07	0.0	57.5	0.0	-0.2	
5/9/18 12:06:17	0.0	58.4	-0.2	-0.5	
5/9/18 12:06:27	0.0	59.3	-0.2	-1.6	
5/9/18 12:06:37	0.0	59.9	0.0	-2.3	
5/9/18 12:06:47	0.0	60.3	-0.1	-2.5	
5/9/18 12:06:57	0.0	60.3	-0.3	-2.3	
5/9/18 12:07:07	0.0	60.5	-0.5	-1.4	
5/9/18 12:07:17	0.0	60.7	-0.4	0.3	
5/9/18 12:07:27	0.0	60.5	0.0	0.3	
5/9/18 12:07:37	0.0	60.3	-0.4	-1.3	
5/9/18 12:07:47	0.0	60.9	-0.3	-2.5	

Time	CO2	SO2	NOx	CO	R9 PostCal
5/9/18 12:34:07	0.0	60.2	0.1	-1.0	
5/9/18 12:34:17	0.0	60.9	-0.1	-0.2	
5/9/18 12:34:27	0.0	60.6	-0.2	0.8	
5/9/18 12:34:37	0.0	60.1	-0.3	0.1	
5/9/18 12:34:47	0.0	60.6	0.0	-1.0	
5/9/18 12:34:57	0.0	61.0	-0.3	-2.7	
5/9/18 12:35:07	0.0	61.1	-0.1	-3.7	
5/9/18 12:35:17	0.0	61.1	-0.1	-2.5	
5/9/18 12:35:27	0.0	60.6	-0.3	-1.5	
5/9/18 12:35:37	0.0	61.2	-0.2	-0.6	
5/9/18 12:35:47	0.0	60.5	-0.2	-0.9	
5/9/18 12:35:57	0.7	50.0	-0.3	-2.4	
5/9/18 12:36:07	1.8	29.9	-0.2	-3.3	
5/9/18 12:36:17	3.1	16.2	-0.2	-4.9	
5/9/18 12:36:27	4.7	9.7	-0.2	-5.5	
5/9/18 12:36:37	6.7	6.2	0.0	-6.2	
5/9/18 12:36:47	9.0	4.0	-0.3	-5.2	
5/9/18 12:36:57	9.5	2.8	0.0	-4.4	
5/9/18 12:37:07	9.7	1.8	-0.1	-4.3	
5/9/18 12:37:17	9.7	1.5	-0.2	-4.9	
5/9/18 12:37:27	9.7	0.6	-0.3	-6.3	
5/9/18 12:37:37	9.8	0.6	-0.2	-6.1	
5/9/18 12:37:47	9.7	0.6	-0.4	-6.0	
5/9/18 12:37:57	9.7	0.3	-0.3	-4.3	
5/9/18 12:38:07	9.7	0.4	-0.2	-3.8	
5/9/18 12:38:17	9.6	0.3	-0.5	-3.7	
5/9/18 12:38:27	9.6	0.1	-0.2	-4.2	
5/9/18 12:38:37	9.6	0.1	0.4	-5.3	
5/9/18 12:38:47	8.1	1.5	1.4	0.3	
5/9/18 12:38:57	6.0	2.3	45.8	20.0	
5/9/18 12:39:07	4.2	1.3	119.3	55.4	
5/9/18 12:39:17	2.7	1.3	149.4	95.3	
5/9/18 12:39:27	1.4	1.2	149.5	126.4	
5/9/18 12:39:37	0.4	1.1	149.3	143.3	
5/9/18 12:39:47	0.1	0.8	149.1	149.0	
5/9/18 12:39:57	0.0	0.7	149.3	150.2	
5/9/18 12:40:07	0.0	1.0	149.4	150.4	
5/9/18 12:40:17	0.0	0.8	149.4	150.5	
5/9/18 12:40:27	0.0	0.9	149.4	151.2	
5/9/18 12:40:37	0.0	0.9	149.3	152.3	

Field Datasheets

EMCo Job Code:

Client: Pacific GP

Source: Unit 2

Date: 5/18

Operator: CK

Page 1 of 1

12 min

Analyzer Initial Calibration Data Sheet					
Gas	Level	Cylinder #	Concentration	Initial Linearity	Initial Bias
CO ₂	L		0.0 %	0.0	0.0
	M	CE00917285	9.115 %	9.0	0.0
	H	CE00917341	18.09 %	18.2	-1.9.2
SO ₂	L		0.0 ppm	-	0.1
	M	CE19294	60.15 ppm	59.4	-59.4
	H	AM000355	148 ppm	148.4	-
NO _x	L		0.0 ppm	0.0	0.0
	M	CE221942	143.4 ppm	144.6	-1.6
	H	AM031952	331.1 ppm	331.0	-1.0
CO	L		0.0 ppm	-	-1
	M	CE221942	144.3 ppm	143.3	-1.0
	H	AM031952	325.3 ppm	325.8	-0.5

Client: Pacifico P

Source: Huntington 2

Date: 5/4/18

Operator: cK

Analyzer Initial Calibration Data Sheet

Gas	Level	Cylinder #	Concentration	Initial Linearity	Initial Bias
CO ₂	L		0.0 %	0.0	
	M	CE0094285	9.115 %	9.1	
	H	CE0094734	18.09 %	18.2	
SO ₂	L		0.0 ppm	-1.2	
	M	CE19294	60.15 ppm	59.7	
	H	AM00355	147 ppm	145.6	
NO _x	L		0.0 ppm	-1.2	
	M	CC721942	143.4 ppm	144.6	
	H	AM031952	331.1 ppm	330.3	
CO	L		0.0 ppm	-0.2	
	M	CC721942	144.3 ppm	147.2	
	H	AM031952	325.3 ppm	324.0	

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133

EMCo Job Code: 043AS-341541

Client: Pacificorp

Source: Huntington 2

Date: 5/9/18

Operator: CK

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79001
77221680

Analyzer Calibration Data Sheet

Gas	Level	Concentration	Initial Bias	Run Start Time	731	200	243	918	953	1028
				R1 Post	R2 Post	R3 Post	R4 Post	R5 Post	R6 Post	
CO ₂	0	0.0 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Span	9.115 %		9.4	9.4	9.3	9.3	9.35	9.5	
			Uncorrected Run Value:	10.7	10.8	10.7	10.7	10.8	10.8	
SO ₂	0	0.0 ppm	0.2	-1.2	0.2	-0.2	-0.2	0.1	-0.2	
	Span	60.115 ppm	58.5	58.6	59.9	59.9	59.8	59.1	58.9	
			Uncorrected Run Value:	21.0	18.9	23.5	23.8	20.8	23.6	
NO _x	0	0.0 ppm	0.1	0.1	-1.2	-1.2	-1	0.0	-1.2	
	Span	143.1 ppm	144.2	145.4	145.5	145.7	145.5	145.3	146.4	
			Uncorrected Run Value:	97.6	97.8	98.4	98.4	98.4	98.4	
CO	0	0.0 ppm	1.2	0.2	-1.4	-1.4	-1.1	-1.7	-1.9	
	Span	144.3 ppm	142.5	148.3	147.7	149.3	148.2	148.4	148.4	
			Uncorrected Run Value:	101.3	94.8	67.6	82.1	63.3	34.5	

77221680

EMCo Job Code: 043AS-341541

Page 3 of 3

Client: Pacificor

Source: Huntington 2

Date: 5/9/18

Operator: CK

Analyzer Calibration Data Sheet

Gas	Level	Concentration	Initial Bias	Run Start Time	1162	1136	1210	R11 Post	R10 Post	R9 Post	R8 Post	Run Stop Time	1122	1156	1230	R12 Post
CO ₂	0	0.0 %			0.0	-0.0	0.0	110.9	111.1	111.3	110.7	110.2	110.7	110.7	110.7	
	Span	9.115 %			9.5	-9.7	9.7									
SO ₂	0	0.0 ppm			0.0	-0.2	-0.2	23.3	25.0	26.0	20.4	20.9	20.9	20.9	20.9	
	Span	60.15 ppm			59.4	-60.4	60.4									
NO _x	0	0.0 ppm			-1.2	-1.2	-1.2	147.9	149.4	149.3	149.7	149.4	149.3	149.3	149.3	
	Span	143.4 ppm			147.9	149.4	149.3									
CO	0	0.0 ppm			100.9	99.7	99.7	140.3	150.5	150.6	140.1	150.7	150.7	150.7	150.7	150.7
	Span	144.3 ppm			140.3	150.5	150.6									

CEMS Data

RATA Test - Part 75

Plant: HGTN Source: UNIT2

Parameter: SO2PPM

Effective Date/Time: 05/09/2018 13:30

Monitoring System ID: 211

Test Reason: QA-Periodic Quality Assurance

Overall RA: 3.97

CEMS Time Offset:

Test Comment:

Unit of Measure: PPM

Test Number: XML (211-Q2-2018-001) / EDR (1)

Frequency: 4QTRS

Test Result: Passed

Overall BAF: 1

043AS-341541-RT-115

Operating Level: High	Level BAF: 1.000	APS Indicator: False	Report in EDR: Y
Mean CEMS: 23.93300	Relative Accuracy: 3.97	tValue: 2.306	Use BAF: Y
Mean Reference: 23.20000	Standard Deviation: 0.24500	Avg Load: 474	Reference Method: 6C
Mean Difference: -0.73300	Confidence Coefficient: 0.18800		

Run	Started	Ended	Reference Value	CEMS Value	Difference	Load	Use
1	05/09/2018 07:31	05/09/2018 07:51	21.3	22.2	-0.9		
2	05/09/2018 08:08	05/09/2018 08:28	19.4	20.0	-0.6		
3	05/09/2018 08:43	05/09/2018 09:03	23.8	24.6	-0.8		
4	05/09/2018 09:18	05/09/2018 09:38	24.2	25.2	-1.0		
5	05/09/2018 09:53	05/09/2018 10:13	21.2	22.3	-1.1		
6	05/09/2018 10:28	05/09/2018 10:48	24.1	24.6	-0.5		
7	05/09/2018 11:02	05/09/2018 11:22	23.8	24.6	-0.8		
8	05/09/2018 11:36	05/09/2018 11:56	25.2	25.6	-0.4		
9	05/09/2018 12:10	05/09/2018 12:30	25.8	26.3	-0.5		
						479	Y

Protocol Gas Details:

Gas Level Code	Gas Type Code	Vendor Identifier	Cylinder Identifier	Expiration Date
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Air Emissions Testing Data

QI Name:	Kormylo, Craig C	AETB Name:	Montrose
Exam Date:	02/05/2016	AETB Phone Number:	303-495-3936
Provider Name:	SES	AETB Email:	ckormylo@montrose-env.com
Provider Email:	qstiprogram@gmail.com		

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 05/09/2018 07:31 Through 05/09/2018 07:51
Time Online Criteria: 1 minute(s)

043AS-34154

Source	Parameter Unit	UNIT 12					
		CO2 (PPM)	COPPM (PPM)	NOX#MM (LB/MMBTU)	NOXPPM (PPM)	SO2#NM (LB/MMBTU)	SO2PPM (PPM)
05/09/18 07:31	10.2	31.4	0.235	111.7	0.048	16.5	452
05/09/18 07:32	10.2	52.5	0.223	105.8	0.062	21.3	452
05/09/18 07:33	10.2	49.2	0.216	102.7	0.067	22.8	454
05/09/18 07:34	10.4	70.3	0.207	100.1	0.069	23.8	459
05/09/18 07:35	10.5	88.9	0.206	100.4	0.070	24.4	466
05/09/18 07:36	10.7	161.2	0.202	100.5	0.072	25.7	471
05/09/18 07:37	10.5	149.8	0.209	101.9	0.071	24.9	474
05/09/18 07:38	10.6	108.8	0.204	100.4	0.069	24.6	476
05/09/18 07:39	10.7	140.6	0.201	100.3	0.069	24.8	476
05/09/18 07:40	10.6	144.0	0.204	100.7	0.067	23.8	475
05/09/18 07:41	10.4	116.7	0.209	100.9	0.065	22.7	473
05/09/18 07:42	10.4	76.4	0.206	99.7	0.063	21.9	471
05/09/18 07:43	10.4	72.3	0.203	98.4	0.061	21.2	470
05/09/18 07:44	10.4	86.1	0.206	99.9	0.060	20.8	469
05/09/18 07:45	10.3	66.4	0.208	99.9	0.060	20.6	470
05/09/18 07:46	10.4	68.0	0.204	98.8	0.059	20.5	472
05/09/18 07:47	10.4	89.2	0.208	100.5	0.059	20.6	474
05/09/18 07:48	10.5	117.9	0.203	99.4	0.060	21.1	477
05/09/18 07:49	10.6	156.0	0.202	99.7	0.062	21.8	477
05/09/18 07:50	10.6	135.1	0.204	100.8	0.061	21.7	477
05/09/18 07:51	10.5	100.1	0.206	100.7	0.060	21.0	475

Source

Parameter

Unit

05/09/18

07:31

10.2

31.4

0.235

111.7

0.048

16.5

452

Average

10.6

99.1

0.208

101.1

0.064

22.2

470

Minimum

10.2

31.4

0.201

98.4

0.048

16.5

452

Maximum

10.7

161.2

0.235

111.7

0.072

25.7

477

Summation

219.5

2,080.9

4,366

2,123.2

1,334

466.5

9,860

Included Data Points

21

21

21

21

21

21

21

21

21

F = Unit Offline

E = Exceedance

C = Calibration

M = Maintenance

T = Out Of Control

* = Suspect

Report Generated: 05/09/18 07:55

S = Substituted

Average Data P-2

Plant: HUNTINGTON PLANT
Interval: 1 Minute

Type: Block
Report Period: 05/09/2018 08:08 Through 05/09/2018 08:28
Time Online Criteria: 1 minute(s)

043AS-34154

Source Parameter Unit	UNIT 2						
	CO2 (PPM)	CO2PPM (PPM)	NOX#MM (LB/MMMBTU)	NOXPBM (PPM)	SO2#NM (LB/MMMBTU)	SO2PPM (PPM)	UNIT LOAD (MW)
05/09/18 08:08 T	10.3	89.4	0.208	99.8	0.058	20.0	473
05/09/18 08:09 T	10.4	124.5	0.206	99.7	0.058	20.2	474
05/09/18 08:10 T	10.4	116.7	0.207	100.2	0.059	20.4	475
05/09/18 08:11 T	10.3	110.9	0.209	100.1	0.056	19.4	475
05/09/18 08:12 T	10.4	93.5	0.205	99.3	0.057	19.8	474
05/09/18 08:13 T	10.4	116.2	0.203	99.2	0.057	19.8	473
05/09/18 08:14 T	10.4	89.1	0.203	99.0	0.055	19.1	473
05/09/18 08:15 T	10.4	80.5	0.202	97.9	0.056	18.9	473
05/09/18 08:16 T	10.5	92.7	0.203	99.1	0.051	17.7	474
05/09/18 08:17 T	10.4	66.0	0.208	100.7	0.050	17.4	474
05/09/18 08:18 T	10.4	55.3	0.213	102.9	0.052	18.2	474
05/09/18 08:19 T	10.4	50.8	0.210	101.7	0.044	15.1	473
05/09/18 08:20 T	10.3	50.9	0.209	100.3	0.047	16.4	473
05/09/18 08:21 T	10.4	69.1	0.206	99.8	0.055	19.2	474
05/09/18 08:22 T	10.4	82.8	0.210	101.8	0.053	18.6	474
05/09/18 08:23 T	10.3	49.6	0.212	101.8	0.056	19.4	475
05/09/18 08:24 T	10.5	71.2	0.206	100.6	0.065	22.8	477
05/09/18 08:25 T	10.5	94.2	0.206	100.4	0.070	24.5	479
05/09/18 08:26 T	10.7	132.2	0.205	101.9	0.070	24.9	480
05/09/18 08:27 T	10.5	107.7	0.211	103.1	0.068	24.1	481
05/09/18 08:28 T	10.5	70.6	0.209	101.9	0.068	23.9	479

Average	10.4	86.4	0.207	100.4	0.057	20.0	475
Minimum	10.3	49.6	0.202	97.9	0.044	15.1	473
Maximum	10.7	132.2	0.213	103.1	0.070	24.9	481
Summation	218.8	1,813.9	4.351	2,109.2	1.204	419.8	9,977
Included Data Points	21	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21	21

F = Unit Offline
E = Exceedance
C = Calibration
M = Maintenance
T = Out Of Control
* = Suspect

Report Generated: 05/09/18 08:29

Average Data

Plant: HUNTINGTON PLANT
Interval: 1 Minute

Type: Block

Report Period: 05/09/2018 08:18 Through 05/09/2018 09:38
Time Online Criteria: 1 minute(s)

Source	Parameter Unit	UNIT12					
		CO2 (PPM)	COPPM (PPM)	NOX#MM (LB/MMBTU)	NOXPBM (PPM)	SO2#MM (LB/MMBTU)	SO2PPM (PPM)
043AS-341544	05/09/18 09:18	10.3	55.9	0.213	102.1	0.075	25.6
	05/09/18 09:19	10.2	61.4	0.215	102.1	0.075	25.8
	05/09/18 09:20	10.3	62.7	0.217	103.9	0.075	25.9
	05/09/18 09:21	10.3	51.2	0.217	103.8	0.073	25.2
	05/09/18 09:22	10.3	72.3	0.215	103.0	0.073	25.4
	05/09/18 09:23	10.3	62.5	0.217	103.9	0.073	25.3
	05/09/18 09:24	10.3	59.4	0.219	104.9	0.074	25.6
	05/09/18 09:25	10.3	62.9	0.218	104.3	0.073	25.2
	05/09/18 09:26	10.4	80.8	0.212	102.4	0.075	26.0
	05/09/18 09:27	10.4	126.0	0.216	104.3	0.075	26.2
	05/09/18 09:28	10.3	84.9	0.217	104.1	0.075	26.0
	05/09/18 09:29	10.3	85.5	0.215	103.0	0.074	25.5
	05/09/18 09:30	10.2	78.8	0.216	102.7	0.072	24.6
	05/09/18 09:31	10.3	73.0	0.214	102.4	0.070	24.1
	05/09/18 09:32	10.3	70.5	0.215	102.8	0.071	24.5
	05/09/18 09:33	10.1	59.6	0.220	103.6	0.071	24.1
	05/09/18 09:34	10.3	86.8	0.214	102.4	0.071	24.6
	05/09/18 09:35	10.3	80.1	0.216	103.7	0.071	24.7
	05/09/18 09:36	10.2	90.0	0.217	103.2	0.072	24.8
	05/09/18 09:37	10.3	132.8	0.213	102.1	0.073	25.3
	05/09/18 09:38	10.2	136.7	0.216	102.5	0.073	25.0

043AS

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Parameter

Unit

Source

CO2 (PPM)

COPPM (PPM)

NOX#MM (LB/MMBTU)

NOXPBM (PPM)

SO2#MM (LB/MMBTU)

SO2PPM (PPM)

UNITLOAD (MW)

Average	10.3	79.7	0.216	103.2	0.073	25.2	474
Minimum	10.1	51.2	0.212	102.1	0.070	24.1	472
Maximum	10.4	136.7	0.220	104.9	0.075	26.2	478
Summation	215.9	1,673.8	4,532	2,167.2	1,534	528.4	9,959
Included Data Points	21	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21	21

F = Unit Offline
E = Exceedance
C = Calibration
M = Maintenance
T = Out Of Control
* = Suspect

Page 42 of 59

S = Substituted
Report Generated: 05/09/18 09:39

Average Data

R-5

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 05/09/2018 09:53 - Through 05/09/2018 10:13
Time Online Criteria: 1 minutes)

043AS-34154

Source	Parameter Unit	UNIT12					
		CO2 (PPM)	COPPM (PPM)	NOX#/MM (LB/MM/BTU)	NOXPBM (PPM)	SO2#/MM (LB/MM/BTU)	SO2PPM (PPM)
05/09/18 09:53	10.4	100.2	0.211	102.3	0.071	24.9	276
05/09/18 09:54	10.4	88.8	0.218	106.5	0.071	24.4	276
05/09/18 09:55	10.2	49.2	0.223	105.9	0.072	24.7	276
05/09/18 09:56	10.1	60.0	0.225	105.6	0.071	24.2	275
05/09/18 09:57	10.1	52.6	0.223	105.0	0.072	24.4	273
05/09/18 09:58	10.1	36.5	0.224	105.1	0.070	23.6	270
05/09/18 09:59	10.0	36.8	0.228	106.1	0.063	21.1	467
05/09/18 10:00	10.0	32.3	0.226	105.3	0.063	21.1	467
05/09/18 10:01	10.1	37.9	0.224	105.2	0.064	21.8	468
05/09/18 10:02	10.3	43.7	0.221	106.1	0.062	21.5	468
05/09/18 10:03	10.4	49.3	0.217	105.0	0.060	21.0	468
05/09/18 10:04	10.4	47.0	0.218	105.7	0.059	20.6	469
05/09/18 10:05	10.4	42.1	0.217	105.2	0.054	18.8	470
05/09/18 10:06	10.4	56.5	0.214	103.4	0.057	19.7	473
05/09/18 10:07	10.5	68.8	0.212	103.6	0.062	21.5	475
05/09/18 10:08	10.5	83.7	0.211	103.3	0.066	23.1	477
05/09/18 10:09	10.5	113.6	0.211	103.3	0.059	24.1	478
05/09/18 10:10	10.4	91.1	0.216	104.3	0.059	24.2	477
05/09/18 10:11	10.4	83.0	0.220	105.6	0.056	22.6	475
05/09/18 10:12	10.3	61.4	0.222	106.4	0.060	20.8	473
05/09/18 10:13	10.2	36.8	0.219	103.9	0.057	19.6	470

Average	10.3	60.5	0.219	104.9	0.065	22.3	472
Minimum	10.0	32.3	0.211	102.3	0.054	18.8	467
Maximum	10.5	113.6	0.228	106.6	0.072	24.9	478
Summation	216.1	1,271.3	4,600	2,202.8	1,358	467.9	9,921
Included Data Points	21	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21	21

F = Unit Offline
E = Exceedance
C = Calibration
M = Maintenance
T = Out Of Control
* = Suspect
Report Generated: 05/09/18 10:15
S = Substituted

Average Data

Plant: HUNTINGTON PLANT
Interval: 1 Minute

Block

Type: Block
Report Period: 05/09/2018 10:28 Through 05/09/2018 10:48
Time Online Criteria: 1 minute(s)

043AS-34154

Source	Parameter Unit	UNIT 12						
		CO2 (PPM)	COPPM (PPM)	NOX#MM (LB/MMBTU)	NOXPPM (PPM)	SO2#NM (LB/MMBTU)	SO2PPM (PPM)	UNIT LOAD (MW)
05/09/18	10:28	10.3	55.4	0.217	103.8	0.073	25.4	474
05/09/18	10:29	10.3	53.5	0.217	104.2	0.072	24.9	474
05/09/18	10:30	10.2	48.0	0.220	104.4	0.073	24.8	473
05/09/18	10:31	10.3	43.0	0.217	104.0	0.072	24.6	472
05/09/18	10:32	10.4	57.3	0.215	103.9	0.071	24.7	471
05/09/18	10:33	10.3	51.6	0.221	103.8	0.070	24.0	470
05/09/18	10:34	10.3	19.9	0.220	103.6	0.069	23.8	469
05/09/18	10:35	10.3	17.7	0.216	103.6	0.069	23.7	469
05/09/18	10:36	10.3	29.1	0.217	103.9	0.069	24.0	468
05/09/18	10:37	10.3	28.0	0.221	103.7	0.070	24.2	468
05/09/18	10:38	10.3	28.0	0.216	103.6	0.071	24.3	468
05/09/18	10:39	10.3	29.0	0.214	102.4	0.072	24.8	470
05/09/18	10:40	10.4	31.0	0.214	103.7	0.072	25.0	471
05/09/18	10:41	10.5	45.0	0.210	102.8	0.072	25.4	473
05/09/18	10:42	10.5	53.6	0.209	102.0	0.072	25.2	473
05/09/18	10:43	10.6	63.0	0.206	101.5	0.073	25.6	474
05/09/18	10:44	10.5	60.2	0.211	103.3	0.072	25.1	474
05/09/18	10:45	10.4	36.0	0.212	102.5	0.072	24.9	474
05/09/18	10:46	10.4	31.2	0.209	101.1	0.070	24.3	474
05/09/18	10:47	10.5	22.0	0.207	100.9	0.070	24.5	473
05/09/18	10:48	10.5	27.2	0.206	100.6	0.069	24.4	473

Average
Minimum
Maximum
Summation

Included Data Points
Total number of Data Points

Average	10.4	39.5	0.214	103.3	0.071	24.6	472
Minimum	10.2	17.7	0.206	100.6	0.069	23.7	468
Maximum	10.6	63.0	0.221	105.8	0.073	25.6	474
Summation	217.9	829.7	4,495	2,169.3	1,493	517.6	9,905

Included Data Points
Total number of Data Points

F = Unit Offline
E = Exceedance
C = Calibration
M = Maintenance
T = Out of Control
* = Suspect
S = Substituted

Average Data

Plant: HUNTINGTON PLANT
Interval: 1 Minute

Type: Block

Report Period: 05/09/2018 11:02 Through 05/09/2018 11:22
Time Online Criteria: 1 minute(s)

043AS-341544

Source	Parameter Unit	UNIT 12					
		CO2 (PPM)	COPPM (PPM)	NOX#MM (LB/MMBTU)	NOxPPM (PPM)	SO2#MM (LB/MMBTU)	SO2PPM (PPM)
05/09/18 11:02	10.3	33.9	0.220	105.5	0.064	21.9	473
05/09/18 11:03	10.3	27.7	0.217	104.1	0.061	20.8	473
05/09/18 11:04	10.3	27.0	0.216	103.6	0.055	19.0	473
05/09/18 11:05	10.3	21.6	0.216	103.5	0.059	20.4	473
05/09/18 11:06	10.4	26.4	0.216	104.5	0.064	22.2	473
05/09/18 11:07	10.4	29.1	0.215	104.0	0.067	23.2	473
05/09/18 11:08	10.4	42.0	0.215	104.0	0.070	24.2	473
05/09/18 11:09	10.4	22.3	0.215	103.9	0.069	24.1	473
05/09/18 11:10	10.5	16.2	0.212	103.4	0.068	23.8	473
05/09/18 11:11	10.6	25.8	0.210	103.6	0.067	23.6	473
05/09/18 11:12	10.5	20.1	0.213	104.2	0.064	22.4	473
05/09/18 11:13	10.3	20.7	0.214	102.5	0.081	27.9	473
05/09/18 11:14	10.5	35.1	0.205	100.1	0.083	29.2	473
05/09/18 11:15	10.5	49.6	0.209	102.2	0.063	29.2	477
05/09/18 11:16	10.3	24.3	0.214	102.6	0.082	28.4	476
05/09/18 11:17	10.3	22.8	0.212	101.6	0.080	27.6	474
05/09/18 11:18	10.3	19.6	0.212	101.5	0.078	26.9	471
05/09/18 11:19	10.3	18.4	0.212	101.5	0.076	26.1	470
05/09/18 11:20	10.2	15.2	0.214	101.8	0.074	25.5	469
05/09/18 11:21	10.3	18.0	0.213	102.1	0.073	25.3	469
05/09/18 11:22	10.3	25.5	0.214	102.7	0.071	24.7	470

Average	10.4	25.8	0.214	103.0	0.071	24.6	473
Minimum	10.2	15.2	0.205	100.1	0.055	19.0	469
Maximum	10.6	49.6	0.220	105.5	0.083	29.2	478
Summation	217.7	541.3	4.484	2,192.9	1.489	516.4	9,935
Included Data Points	21	21	21	21	21	21	21
Total number of Data Points	21	21	21	21	21	21	21

F = Unit Offline
E = Exceedance
C = Calibration
M = Maintenance
T = Out Of Control
* = Suspect
S = Substituted

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 05/09/2018 11:36 Through 05/09/2018 11:56
Time Online Criteria: 1 minute(s)

Source	Parameter Unit	UNIT#12					
		CO2 (PPM) (PCT)	COPPM (PPM)	NOX#NM (LB/MMBTU)	NOXPBM (PPM)	SO2#MM (LB/MMBTU)	SO2PBM (PPM)
043AS-341544	05/09/18 11:36	10.3	12.0	0.219	104.8	0.070	24.0
	05/09/18 11:37	10.3	9.7	0.217	104.2	0.070	24.3
	05/09/18 11:38	10.4	18.4	0.215	104.1	0.071	24.8
	05/09/18 11:39	10.3	18.0	0.218	104.6	0.071	24.5
	05/09/18 11:40	10.4	26.2	0.212	102.6	0.073	25.6
	05/09/18 11:41	10.5	40.1	0.208	101.6	0.075	26.1
	05/09/18 11:42	10.4	48.7	0.212	102.8	0.074	25.8
	05/09/18 11:43	10.5	54.0	0.208	101.5	0.075	26.1
	05/09/18 11:44	10.5	53.2	0.210	102.4	0.074	26.3
	05/09/18 11:45	10.4	40.7	0.217	104.8	0.072	24.9
	05/09/18 11:46	10.3	18.5	0.213	102.0	0.072	24.8
	05/09/18 11:47	10.3	15.7	0.215	102.8	0.075	25.8
	05/09/18 11:48	10.3	17.4	0.212	101.5	0.076	26.2
	05/09/18 11:49	10.4	19.6	0.208	100.8	0.076	26.4
	05/09/18 11:50	10.3	30.6	0.201	96.4	0.076	26.1
	05/09/18 11:51	10.3	49.7	0.202	96.8	0.077	26.5
	05/09/18 11:52	10.4	54.0	0.199	96.2	0.073	25.4
	05/09/18 11:53	10.5	102.5	0.195	95.2	0.074	26.3
	05/09/18 11:54	10.5	131.7	0.196	95.6	0.074	26.0
	05/09/18 11:55	10.5	108.9	0.196	95.6	0.074	26.2
	05/09/18 11:56	10.6	110.3	0.194	95.7	0.073	25.8

Source

Parameter

Unit

043AS-341544

05/09/18

11:36

Average

Minimum

Maximum

Summation

Average

Minimum

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 05/09/2018 12:10 Through 05/09/2018 12:30
Time Online Criteria: 1 minute(s)

2-Q

043AS-34154

Source	UNIT2					
	CC2 (PCT)	COPPM (PPM)	NOX#MM (LB/MMBTU)	NOXPPM (PPM)	SO2#MM (LB/MMBTU)	SO2PPM (PPM)
05/09/18 12:10	10.8	187.4	0.192	96.4	0.063	22.6
05/09/18 12:11	10.6	126.4	0.196	96.5	0.055	19.6
05/09/18 12:12	10.6	89.9	0.193	95.0	0.071	25.2
05/09/18 12:13	10.6	148.1	0.193	95.2	0.076	26.9
05/09/18 12:14	10.4	134.8	0.197	95.2	0.075	26.2
05/09/18 12:15	10.5	132.4	0.194	94.8	0.079	27.7
05/09/18 12:16	10.5	143.2	0.195	95.3	0.080	28.2
05/09/18 12:17	10.5	105.9	0.196	96.0	0.080	28.3
05/09/18 12:18	10.5	121.5	0.196	95.8	0.082	28.8
05/09/18 12:19	10.6	145.0	0.194	95.7	0.082	29.0
05/09/18 12:20	10.7	198.4	0.192	95.6	0.081	28.9
05/09/18 12:21	10.6	173.3	0.195	96.3	0.079	28.1
05/09/18 12:22	10.6	117.6	0.195	96.0	0.079	28.0
05/09/18 12:23	10.5	105.3	0.195	95.5	0.077	27.2
05/09/18 12:24	10.5	144.1	0.196	95.9	0.077	27.0
05/09/18 12:25	10.5	133.1	0.196	95.8	0.074	26.2
05/09/18 12:26	10.5	93.9	0.195	95.2	0.072	25.4
05/09/18 12:27	10.5	105.0	0.195	95.5	0.072	25.3
05/09/18 12:28	10.4	99.0	0.197	95.4	0.070	24.5
05/09/18 12:29	10.5	115.8	0.196	95.6	0.071	24.7
05/09/18 12:30	10.5	132.2	0.195	95.4	0.071	25.0

Included Data Points

Total number of Data Points

Average

Minimum

Maximum

Summation

10.5

10.4

10.8

221.4

131.3

89.9

198.4

2,756.3

0.195

0.192

0.197

4.093

95.6

94.8

96.5

2,008.1

0.075

0.065

0.082

1,566

26.3

19.6

29.0

552.8

4.80

4.78

4.82

10,070

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Analyzer Interference Check

To Whom It May Concern:

In an effort to assist our customers with meeting the requirements of the Instrumental Methods for testing, 3A, 6C, 7E, 10, and 20, we are providing a summary of interferences for certain Thermo Scientific analyzers.

The requirement for conducting analyzer interference checks for potential interfering gases is the responsibility of the testing organizations. The Methods do, however, allow the manufacturer of instruments to provide this data. Tests are required to be conducted on the same "make and model" as those being used for method testing.

The information contained in the accompanying tables pertains to the "make" of analyzers under the names of; Thermo Electron Corporation, Thermo Environmental Instruments and Thermo Scientific. The "model" are models; Model 42 for NO, NO₂, NO_x, Model 43 for SO₂, and Model 410i for CO₂. The specific pollutant detection and analytical technology for each of the above listed specific models have remained the same for the various series of analyzers manufactured over the past years. Therefore, the interference test results shown for iSeries analyzers would produce essentially the same results for C Series and earlier Series of these models.

The potential interference gases test results shown in the tables to follow indicate that none of the Thermo Scientific analyzers tested have a collective analytical detection interference that would sum more than 0.06% of analyzer span value. The acceptance criterion is; the sum of the interference responses must not be greater than 2.5% of analyzer span value.

If you have any questions regarding the information contained herein please do not hesitate to contact us.

Thermo Fisher Scientific



Frank Duckett
Product Manager, Continuous Gas Analyzers
Air Quality Instruments

Thermo Scientific Model 42 NO-NO₂-NO_x Analyzer Potential Interference Gas Responses

<i>Potential Interferent</i>		<i>Model 42iLS</i>			<i>Model 42iHL</i>		
<i>Test Gas</i>	<i>Concentration</i>	<i>NO</i>	<i>NO₂</i>	<i>NO_x</i>	<i>NO</i>	<i>NO₂</i>	<i>NO_x</i>
CO ₂	5.20%	0.001	0.004	0.004	0.001	0.003	0.004
CO ₂	15.60%	0	0.003	0.003	0.001	0.004	0.005
H ₂ O	1.00%	0	0	0	0.003	0.001	0.004
NO	15 ppm	14.9	0.1	15	15	-0.06	14.99
NO ₂	15 ppm	1.1	14	15	0.4	14.6	15
N ₂ O	10 ppm	0	0	0	0	0	0
CO	50 ppm	0	0	0	0	0	0
SO ₂	21 ppm	-0.01	0	-0.01	0.007	0	0.007
CH ₄	50 ppm	0	0	0	0	0	0
HCl	10 ppm	0	0.006	0.006	0	0.004	0.004
NH ₃ ¹	10 ppm	0	0	0	0.17	8.9	9.1
<i>Sum of Responses</i>		0.011	0.01	0.02	0.011	0.009	0.02
<i>Span Value</i>		160	152	160	160	152	160
<i>% of Calibration Span</i>		0.01%	0.01%	0.01%	0.01%	0.01%	0.01%

Acceptance Criteria found in Section 13.4 of Method 7E is the sum of responses must not be greater than 2.5% of the analyzer calibration span value.

¹NH₃ interferent results shown for the Model 42iHL was not used in calculation of interference response check because it is a known interferent with an approximate 1 ppm to 1 ppm positive bias in analyzers using stainless steel NO₂ to NO converters. Thermo recommends that NO_x analyzers with stainless steel NO₂ to NO converters must use a NH₃ scrubber when testing sources with potential NH₃ in the flue gas.

This document is subject to change without notice.

Thermo Scientific Model 43 SO₂ and Model 410i CO₂ Analyzer Potential Interference Gas Responses

<i>Potential Interferent</i>		<i>Model 43iLH</i>	<i>Model 410iHL</i>
<i>Test Gas</i>	<i>Concentration</i>	<i>SO₂</i>	<i>CO₂</i>
CO ₂	5.20%	0.03	5.2
CO ₂	15.60%	0.14	15.6
H ₂ O	1.00%	-0.05	0
NO	15 ppm	0.2	0
NO ₂	15 ppm	0.06	0
N ₂ O	10 ppm	0	0
CO	50 ppm	0	0
SO ₂	21 ppm	21	0
CH ₄	50 ppm	0	0
HCl	10 ppm	0	0
NH ₃	10 ppm	0	0
<i>Sum of Responses</i>		0.45	0
<i>Span Value</i>		800	16
<i>% of Calibration Span</i>		0.06%	0%

Acceptance Criteria found in Section 13.4 of Method 7E is the sum of responses must not be greater than 2.5% of the analyzer calibration span value.

This document is subject to change without notice.

Sample Calculations

PacifiCorp
 Huntington Unit 1
 5/10/2018
 Run #1 Sample Calculations

**EPA Method 6C: Determination of Sulfur Dioxide Emissions from Stationary Sources
 (Instrumental Analyzer Procedure)
 (40 CFR Part 60, Appendix A-4)**

Variable	Value	Definition	Unit of Measurement
C_{avg}	43.3	Average Unadjusted Gas Concentration	ppmvw
C_0	0.0	Average Pre/Post Zero Gas Response	ppmvw
C_{ma}	60.2	Concentration of Upscale Calibration Gas	ppm
C_m	59.5	Average Pre/Post Upscale Gas Response	ppmvw
C_{gas}	43.8	Average Gas Concentration Adjusted for Bias	ppmvw
MW	64.06	Molecular Weight	lb/lb-mole
385.3	385.3	Volume of One Pound of Ideal Gas at Standard Conditions	scf/lb-mole
F_c	1800	F Factor from EPA Method 19	scf/mmBtu
C_w	7.28E-06	Pollutant Concentration, Wet Basis	pound/wet standard cubic foot
$CO_2\%vw$	10.6	CO_2 Concentration	wet volume percent
$E_{lb/mmBtu}$	0.124	Emission Rate	pounds per million British thermal units
Q_{wsch}	77,916,133	Exhaust Flow Rate (From EPA Method 2F)	wet standard cubic feet per hour
$E_{lb/hr}$	567.3	Emission Rate	pounds per hour

$$C_{gas} = \frac{(C_{avg} - C_0) \times C_{ma}}{(C_m - C_0)}$$

$$= \frac{(43.3 - 0) \times 60.15}{(59.45 - 0)}$$

$$= 43.8 \text{ ppmvw} \quad (Eq. 7E-5b)$$

$$C_w = \frac{(C_{gas}) (MW)}{(10^6) (385.3)}$$

$$= \frac{(43.8) (64.06)}{(10^6) (385.3)}$$

$$= 7.28E-06 \text{ lb/scf}$$

$$E_{lb/mmBtu} = \frac{(C_w) (F_c) (100)}{(CO_2\%vw)}$$

$$= \frac{(7.28E-06) (1800) (100)}{(10.6)}$$

$$= 0.1 \text{ lb/mmBtu} \quad (Eq. 19-7)$$

$$E_{lb/hr} = (C_w) (Q_{wsch})$$

$$= (7.28E-06) (77,916,133)$$

$$= 567.3 \text{ lb/hr}$$

PaciFiCorp
Huntington Unit 1
5/10/2018
Relative Accuracy Test Audit Sample Calculations
NO_x (lb/mmBtu)

Run #	RM	CEM	d	d ²
1	0.192	0.199	-0.007	0.00005
2	0.202	0.210	-0.008	0.00006
3	0.191	0.198	-0.007	0.00005
4	0.186	0.192	-0.006	0.00004
5	0.184	0.190	-0.006	0.00004
6	0.187	0.192	-0.005	0.00003
7	0.185	0.192	-0.007	0.00005
8	0.184	0.191	-0.007	0.00005
9	0.183	0.191	-0.008	0.00006
10				
11				
12				
Average	0.188	0.195	-0.007	0.00005
Sum	n/a	n/a	-0.061	0.00042
Sum ²	n/a	n/a	0.0037	n/a

Variables

$\sum d_i^2$	0.00042	Sum of the Squared Differences
$[\sum d_i]^2$	0.0037	Square of the Summed Differences
n	9	Number of Test Runs
S_d	0.001	Standard Deviation of Differences
$t_{0.0975}$	2.306	T-value from PS2, Table 2-1
CC	0.001	2.5% Confidence Coefficient
d	0.007	Absolute Average Difference
CC	0.001	Absolute Confidence Coefficient
RM	0.188	Average RM Value
RA	4.0%	Relative Accuracy

$$S_d = \sqrt{\frac{[\sum d_i]^2}{n-1}}$$

$$\sqrt{\frac{0.004}{0.000 - \frac{9}{8}}} = 0.001$$

$$CC = \frac{(t_{0.0975}) S_d}{\sqrt{n}}$$

$$= \frac{(2.306) (0.001)}{3} = 0.001$$

$$RA = \frac{|d| + |CC|}{RM} (100)$$

$$= \frac{0.007 + 0.001}{0.188} (100) = 4.0\%$$

EPA Protocol 1 Gas Certificates

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0316	Reference Number:	153-401118346-1
Cylinder Number:	CC119294	Cylinder Volume:	144.4 CF
Laboratory:	124 - Tooele (SAP) - UT	Cylinder Pressure:	2015 PSIG
PGVP Number:	B72018	Valve Outlet:	660
Gas Code:	SO2,BALN	Certification Date:	Feb 12, 2018

Expiration Date: Feb 12, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
SULFUR DIOXIDE	60.00 PPM	60.15 PPM	G1	+/- 0.9% NIST Traceable	02/05/2018, 02/12/2018
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	16011045	CC473289	49.02 PPM SULFUR DIOXIDE/NITROGEN	0.8%	Jun 17, 2022

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801550 SO2 LSO2	FTIR	Feb 01, 2018

Triad Data Available Upon Request



Signature on file

043AS-341 Approved for Release

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Appendix B: STAC Certification

Montrose Air Quality Services (Montrose) is an Air Emission Testing Body (AETB) operating in conformance with ASTM D7036-04, as required by 40 CFR Part 75, Appendix A §6.1.2. The table below lists the EPA Reference Methods for which each listed Project Manager is a Qualified Individual and other relevant information required by (as applicable) 40 CFR Part 75.59(a)(15), 40 CFR Part 75.59(b)(6) and 40 CFR Part 75.59(d)(4).

Montrose Air Quality Services LLC – Denver Office (800) 984-9883 AETB Qualified Individual Information					
QI Name	QI Email	Exam*	Exam Date	Exam Provider	Provider Email
Scott Bouchard	sbouchard@montrose-env.com	SES Group 1 SES Group 3	4/7/2017 8/11/2017	SES	QSTIprogram@gmail.com
Andrew Bruning	abruning@ montrose-env.com	SES Group 1 SES Group 2 SES Group 3	6/12/2014 9/18/2015 6/12/2015	SES	QSTIprogram@gmail.com
Craig Kormylo	ckormylo@ montrose-env.com	SES Group 1 SES Group 3	2/5/2016	SES	QSTIprogram@gmail.com
Matthew Parks	mparks@ montrose-env.com	SES Group 1 SES Group 2 SES Group 3	2/5/2016 9/18/2015 2/5/2016	SES	QSTIprogram@gmail.com

*The Source Evaluation Society (SES) Group 1 Exam includes EPA Reference Methods 1, 1A, 2, 2A, 2C, 2D, 2F, 2G, 2H, 3, 3B, 4, 5, 5A, 5B, 5D, 5E, 5F, 5I, 17, 19, 201A and 202.

The SES Group 2 Exam includes EPA Reference Methods 1, 2, 3, 4, 3B, 6, 6A, 6B, 7, 7C, 7D, 8, 11, 13A, 13B, 15A, 16A, 19, 26, 26A and 202.

The SES Group 3 Exam includes EPA Reference Methods 3A, 6C, 7E, 10, 10B, 20, 25A, 40 CFR Part 60 Performance Specifications 2 – 8, 15 and 40 CFR Part 75.

The SES Group 4 Exam includes EPA Reference Methods 1-4, 12, 19, 29, 30B, 101, 101A, 102, and ASTM D6784-02.

Accredited Air Emission Testing Body

A2LA has accredited

MON'TROSE AIR QUALITY SERVICES

In recognition of the successful completion of the joint A2LA and Stack Testing Accreditation Council (STAC) evaluation process, this laboratory is accredited to perform testing activities in compliance with ASTM D7036:2004 - Standard Practice for Competence of Air Emission Testing Bodies.

Presented this 5th day of March 2018.



President and CEO
For the Accreditation Council
Certificate Number 3925.01
Valid to February 29, 2020



This accreditation program is not included under the A2LA ILAC Mutual Recognition Arrangement.